German Federal—126th Year

La 126ème année de la Deutsche Bundesbahn
Die Deutsche Bundesbahn im 126. Jahr
El 126 año del Deutsche Bundesbahn

INTERNATIONAL Railway Journal

March 1961

A Special Permanent Way Edition

▶ Un Numéro Spécial sur les Installations Fixes

▶ Eine Sondernummer über Gleise und Feste Anlagen

▶ Número especial sobre vías permanentes

$1.00
30.7.2
A Railway Age Publication

Standardize

ON COMPLETE

ROLLS-ROYCE

DIESEL-HYDRAULIC EQUIPMENT

FOR SHUNTING, FREIGHT AND MIXED TRAFFIC LOCOMOTIVES

• Compact power • Competitive price • Proven running economy • Easy maintenance • Long periods between overhauls • Rationalized spare parts • World-wide after-sales and spares service • Technical advice from specialist Railway Traction Department • Diesel-electric and diesel-mechanical equipment may also be supplied

Builders of locomotives and railcars, and operators who are considering redesigning and re-engining existing equipment, are invited to write to:

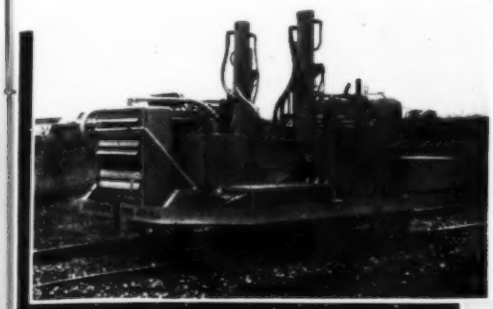
ROLLS-ROYCE LIMITED · RAILWAY TRACTION DEPARTMENT · SHREWSBURY *(Tel: 52262)* ENGLAND

ROLLS-ROYCE—AERO ENGINES · MOTOR CARS · DIESEL AND PETROL ENGINES · ROCKET MOTORS · NUCLEAR PROPULSION

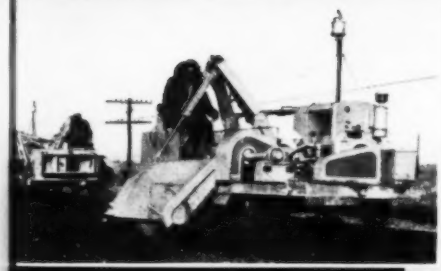
KERSHAW Presents

A *Complete* LINE of TRACKWORK EQUIPMENT

Now **THREE NEW MACHINES**

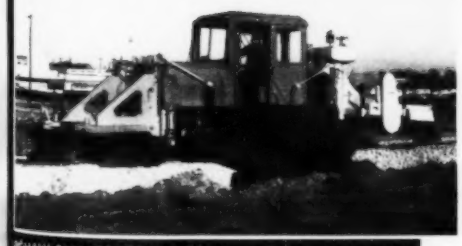


KERSHAW SUPER JACK-ALL — A combination hydraulic jack-tamper designed for high production track raises. This machine is equipped with an automatic leveling device.



HAW TWO-WHEEL KRIBBER — In skeletonizing, removes st from center of tracks between the ties. Also skele-es outside rails.

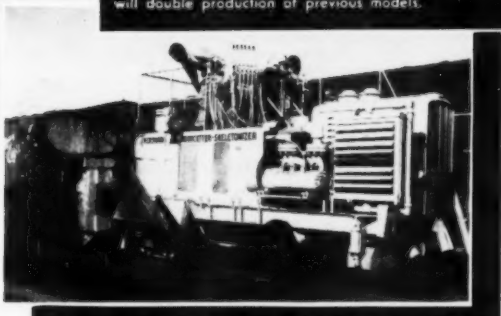
KERSHAW TIE-BED SCARIFIER WITH INSERTER ATTACHMENT — Used to scarify old, cemented tie beds and to insert new ties. Machine is equipped with attachment for cleaning cribs.



SHAW BALLAST REGULATOR (Heavy Duty) — Performs 14 rent operations including track patroling, regulating and ping shoulder ballast, and distributing ballast ahead of s gangs. Some five improvements over previous models.

These new machines fit perfectly into the Kershaw lin of equipment, a line that has won wide acceptanc on the world's railroads. Several hundred thousan dollars have been spent developing and testin these machines during the past several years They are designed and developed to fit int ANY track reconditioning package. Mor than 500 Kershaw Ballast Regulators hav been put in service on railroads in this countr and abroad. Nearly 400 Kershaw Kribbers hav been put in service, nearly 100 Track Brooms nearly 100 Jackalls, and hundreds of other ma chines. For YOUR railroad track maintenanc program, now, more than ever, look to Kershaw for leadership. KERSHAW . . . Trackwor Equipment designed, developed and proven on th world's railroads.

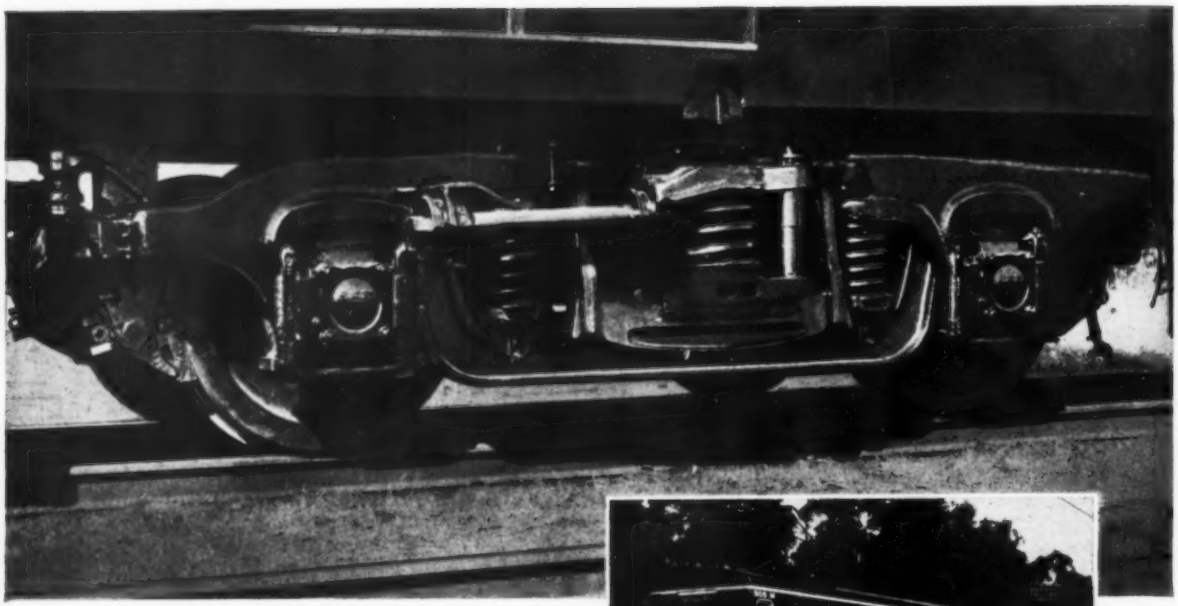
KERSHAW BALLAST CLEANER — For removing old b from track, cleaning it and returning to track. This ma will double production of previous models.



KERSHAW UNDERCUTTER AND SKELETONIZER — Used in skeletonizing and undercutting operations to remove foul ballast and to lower track.

KERSHAW
MANUFACTURING CO. INC
MONTGOMERY K ALABAMA
U. S. A.

...where railway progress is cast in steel



Local Transit or Inter-City

COMMONWEALTH-DESIGNED BOGIES TO FIT YOUR PURPOSE

For more than 50 years, General Steel Castings has designed, furnished and service-tested Commonwealth motor bogies to meet the special demands of railways and transit systems throughout the world.

All this experience is at your disposal, to develop the particular design which will provide your system with the best in motor bogies. Each design is based on General Steel's superior one-piece cast steel frame and auxiliary components which contribute to better operation, greater passenger comfort and lower operating costs.

For *your* car building or modernization program, specify Commonwealth bogies.

Commonwealth products are furnished completely machined and are designed for all track gauges by

GENERAL STEEL CASTINGS CORPORATION

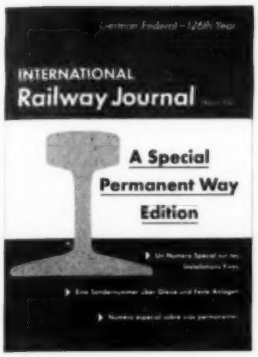
Granite City, Ill. • Eddystone, Pa. • Avonmore, Pa., U. S. A.

Commonwealth Products are produced under license in Australia, Canada, England and South Africa

COMMONWEALTH SALES CORPORATION

International Representatives: Granite City, Illinois, U. S. A., *Telegraph:* "Comsteelco"

March 1961



Editorial Offices:
Lange Poten 29, The Hague, Netherlands
Postbox 305, Tel. 18 37 82,
Cable SIMMBOARD

Executive Offices:
30 Church St., New York 7, N.Y., U.S.A.

MANAGING DIRECTOR ROBERT G. LEWIS

Publisher ..... David W. Beadle
Executive Editor..... J. W. Kizzia

Associate Editors:
London ..... Robert Spark
New York ..... Marion Odomirok

Art Editor ..... Joel Petrower

Regional Editors:
Sydney ..... F. A. Drew
Bogota ..... Carlos Ricuarte Samper
Havana ..... Benigno Perez Taboada
New Delhi ..... Krishen Ghulati
Tokyo ..... Alan B. Clapford
Manila ..... P. S. Estayo
Istanbul ..... Wm. D. Middleton
Johannesburg ..... P. C. Kleyn

Editorial Assistant ..... Baukje C. Westra

EDITORIAL DIRECTOR .. JAMES G. LYNE

ADVERTISING SALES

LONDON S.W. 1, ENGLAND
Max F. Holsinger,
Director International Operations,
67/68 Jermyn Street, St. James's,
Telephone: TRAfalgar 6318

Northern Office:
Philip King,
11 Tewit Well Rd.
Harrogate, Yorks.
Telephone: Harrogate 69212

DÜSSELDORF, GERMANY
Max F. Holsinger,
Huttenstrasse 17, am Ernst-Reuter-Platz
Telephone: 14904

TOKYO, JAPAN
George E. Olcott
No. 1 Kotohira-Cho Shiba
Minato-Ku

NEW YORK 7, N.Y., U.S.A.,
Duane C. Salisbury,
Executive Vice President-Sales
30 Church St.,
Telephone: WOrth 4-3060

CHICAGO 3, ILL.
79 W. Monroe Street
Telephone: RAndolph 6-0794

International Railway Journal

PRINTED IN THE NETHERLANDS

Switzerland: Five New Trainsets ..... p. 18

Soviet Union: Caspian Sea Train Ferry ..... p. 24

West Germany: Railways' 126th Year ..... p. 26

Turkey-Iran: First Railway Link ..... p. 45

UIC: New President Tells Its Aims ..... p. 58

Special Permanent Way Section

Photogrammetry: Aid to Railway Location ..... p. 34

Netherlands: Zig-Zag Sleepers ..... p. 38

Permanent Way Products ..... p. 40

Japan: Detachable Rotary Plow ..... p. 42

Switzerland: Prefabricated Track Plant ..... p. 44

Departments

World Report ..... p. 7

Railway Bookshelf ..... p. 9

Short Lines ..... p. 13

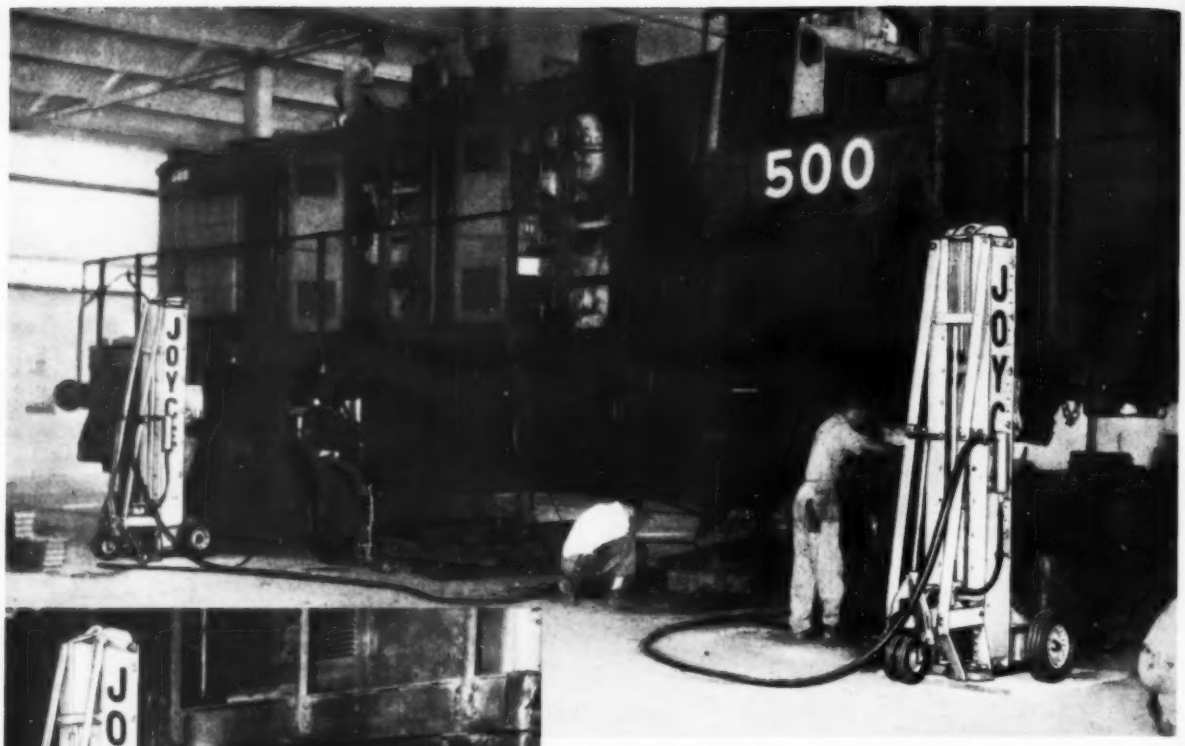
World Poll ..... p. 14

World Market ..... p. 17

After Hours ..... p. 49

Advertisers' Index ..... p. 57

SUBSCRIPTION INFORMATION: Circulation Department, INTERNATIONAL RAILWAY JOURNAL, 30 Church Street, New York 7, N.Y., U.S.A., R. C. Van Ness, Director of Circulation.
Send Subscription orders and requests to change address to the above address. Orders and requests should include the following information: (1) Your title or position; (2) name of firm and nature of business; (3) complete mailing address. On change of address, please include address used on this copy of INTERNATIONAL RAILWAY JOURNAL.
SUBSCRIPTION PRICES: One year (12 issues): Outside the United States: $7.00 (US), Sterling £2.10.0; Single copies: $1.00 (US), 7/2d. Send to INTERNATIONAL RAILWAY JOURNAL, c/o Sibley-Field Publishing Co., Ltd., 8/9 Clerkenwell Green, London E.C. 1, England. Other European funds: Send to INTERNATIONAL RAILWAY JOURNAL, Postbox 305, The Hague, Netherlands.
COPYRIGHT, 1961, by Simmons-Boardman Publishing Corporation. Contents may not be reproduced without permission.



Four synchronized Joyce 35-AHL Jacks lift diesel locomotive free of trucks. Air operation through multiple-valve arrangement assures level rise.

Closer view shows how locomotive body can be lifted entirely off trucks. Four jacks could also be used to lift locomotive, trucks and all, entirely off track.

JOYCE ALUMINUM, AIR-OPERATED SHOP JACKS

speed service on diesel locomotives and all railroad cars

A satisfied customer states:
". . . the Joyce Model 35-AHL compressed air jacks each of 35 tons capacity, which we purchased, are fulfilling expectations and are perfectly adapted to the services to which they have been put on this railroad."
Oscar Funes
Ing. Sub-Jefe del Departamento de Locomotoras
ESTRADA DE FERRO ARARAQUARA

Features of joyce 35-AHL jacks:
One-Man Operation . . . lightweight aluminum alloy construction saves weight. Three wheels equipped with semi-pneumatic tires make trundling and positioning of the jack an easy one-man job.

Air Motor Operated . . . for safety, convenience and labor savings.

Can be Synchronized . . . jacks can be used singly . . . or 2, 3, or 4 jacks can be synchronized through multiple-valve arrangement for positive level lifting.

Built-In Safety . . . jack stops automatically at top and bottom of rise . . . automatically locks under load in case of air failure. Low center of gravity gives jack excellent stability.

Specifications . . . 35 tons capacity . . . 4 ft. $4^1/_2$ inches rise . . . weight 1620 pounds . . operates on 90 PSI pressure.

Write for complete information

THE JOYCE-CRIDLAND COMPANY
Baldwin-Lima Hamilton Corp., Export Department, Philadelphia 42, Pa., U.S.A.

WORLD REPORT

European Railways Cooperate to Improve International Services

Cooperation between various European railway systems is expected to result in better international passenger services with advent of summer timetables.

Rules for improvement of travel on Moscow-Paris and Moscow-Hook of Holland-London lines were recently drawn up at Moscow by representatives of British, Dutch, French, Soviet, Polish, West and East German railroads, the Compagnie Internationale des Wagons-Lits and the Zeeland Steamship Co. New-type coaches, with first and second class seats, will be introduced, and passengers will be able to change from one class to another.

In eastern Europe, the Organization for Railway Cooperation is stressing the need for common frontier stations, where customs inspections may be carried out jointly by the countries involved. The objective is to reduce the border delays which have largely offset faster operating schedules for international trains. The Balt-Orient Express, for example, runs from Berlin East to Sophia in 43.5 hours—six of which represent standing time at four frontiers.

Through tri-weekly sleeping car service between Rome and Moscow will be inaugurated this summer. The new international service, which will probably be handled by Russian cars with first and second class accommodations, will take 64 hours for 3200 km.

●

RHODESIA: Effective 1 Feb., Rhodesian railways are being reorganized on a divisional in lieu of a departmental system. The new setup provides for three regions—Salisbury, Bulawayo and Broken Hill-Livingstone. Each will be headed by a regional manager, who will have greater powers than are now vested in district officers, and be responsible for all day-to-day operations. Regional staff officers will report to the regional manager. Headquarters staff will be reorganized into five divisions—operations, engineering, commercial and accounting, personnel, and planning, research and coordination.

. . . With completion of CTC on the Bulawayo-Victoria Falls-Livingstone line, Rhodesian railways now have a continuous 482-km CTC section. By 1963, all main lines except that to Lourenço Marques will be under CTC—a total of 2000 route-km.

LIBERIA: A 265.5-km railway is being built to connect the port of Buchanan with a high-grade iron ore project being developed in the Nimba mountains by the Liberian-American-Swedish Minerals Co. (LAMCO) A $30,000,000 Eximbank credit will be spent for US goods and services, principally for harbor, railway and mining equipment. Construction of the harbor and railway, under contract with Raymond International, New York, has begun, and first iron ore shipments are expected in mid-1963.

COLOMBIA: The government is negotiating for purchase of the FC de Antioquia. Conclusion of a formal agreement would end departmental control of railroads, and bring all former departmental railroads under government control.

SPAIN: Spanish National Railways (RENFE) plan to spend about 225,000,000 pesetas between now and 1963 on modernization of the Zamora-Medina del Campo line.

SWEDEN-USA: Alwac International, owner of the Swedish Alweg monorail system, is under contract to build a 1.6-km monorail to carry 8000 passengers per hour between downtown Seattle (Washington state, USA) and the "Century 21 Exposition," a world's fair which will open in Seattle in April 1962.

INDIA: With potential production of railway coaches now more than adequate to meet domestic requirements of 1200 a year, India expects shortly to enter the export market. Production includes an anticipated 900 a year by the Integral Coach Factory at Parambur; 300 by the Hindustan Aircraft factory at Bangalore; and 300 meter-gauge and 700 M-U cars by Jessops, at Calcutta.

. . . A 302-km, meter-gauge railway between Khandwa and Hingoli has been opened to traffic. Built at a cost of Rs. 123,900,000, the line is expected to facilitate traffic movement between meter-gauge systems in the north and the south, hitherto connected only by broad-gauge tracks.

QUEENSLAND: Ford, Bacon & Davis, New York engineering and construction firm, will make a management study of the Queensland Railways. The study, which will take over a year to complete, is aimed at improving operating results. The FB&D firm is also engineer-manager of the Queensland Railways' $70,000,000 Mt. Isa rehabilitation project.

POLAND: The Polish rolling stock manufacturing industry is reported to have received orders totaling $35,000,000 during 1960. Most of the orders came from Communist countries, but some were from India and Turkey. In future, the Cegielski works at Posen will concentrate on diesel locomotives and motor coaches; the Pafawag plant at Breslau will build electric locomotives; and the Konsdal plant at Königshütte will manufacture narrow-gauge equipment.

CONTINUED ON PAGE 10

JACKSON

THE NAME THAT HAS CONSISTENTLY TYPIFIED THE BEST IN TAMPING EQUIPMENT FOR MORE THAN 40 YEARS

Let us help you to the best solution of your tamping problems.

1 JACKSON TRACK MAINTAINER

For both putting up and maintaining track of finest, longest-lasting quality at minimum cost, this is the finest tamping machine money will buy. Powerful vibratory action and complete push-button control make it exceedingly fast. It's overwhelmingly first choice of U.S.A. railways. Available in U.S.A. standard and wider gauges.

2 JACKSON UNIVERSAL

An excellent production tamper which rapidly produces complete consolidation of ballasts up to 3" in diameter in proportionate out-of-face raises. Highly efficient in tamping hanging ties or sleepers. Entirely push-button operated. Jacks and automatic spacer for double joint ties optional. Available in all standard gauges from meter to widest.

3 JACKSON MONORAIL

A complete tamping machine ideal for spotting and smoothing, secondary programs and all yard track maintenance. Utilizes powerful "Maintainer" tamping units. Traveling, indexing and workhead are all hydraulically controlled. All standard gauges.

4 JACKSON HAND TAMPERS

Vibratory-electric . . . operated from portable power plant serving 4 tampers. Universally used in low lift and smoothing work as well as major ballast insertion operations. Adjustable handles and interchangeable tamping blades make them quickly adaptable to all workers and tamping requirements.

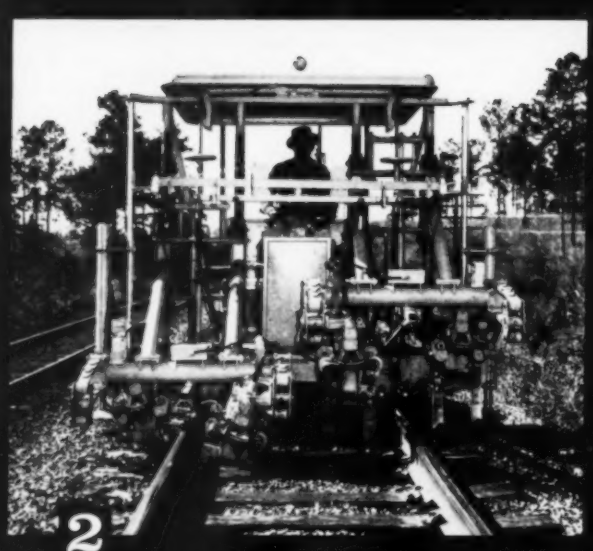
Write, wire or cable for complete information

JACKSON VIBRATORS, INC.

LUDINGTON, MICHIGAN U.S.A.

R08

1


2

3

4

(Advertisement)

1. MACHINE JACKSON POUR L'ENTRETIEN DES VOIES

Action vibrante à grande capacité. Service complet par appui sur bouton. Meilleur pour la pose et l'entretien des voies. Système le plus demandé par les chemins de fer américains. Livrable pour tous les écartements de voie standard E.U.A. et autres.

2. JACKSON UNIVERSAL

Une bourreuse à production excellente, donnant une consolidation rapide au ballast. Très efficace pour fixer les traverses. Vérins et régulateurs automatiques de traverses à double joints au choix. Service par appui sur bouton. Livrable pour tous les écartements de voie d'un mètre et plus.

3. JACKSON MONORAIL

Machine à bourrer complète, à fonctionnement hydraulique. Excellente également pour marquer, égaliser et entretenir les voies. Tous les écartements normaux.

4. BOURREUSE À MAIN JACKSON

A vibrations électriques, opéré d'une centrale électrique portable desservant quatre bourreuses. Manettes et aubes réglables pour buts divers.

1. JACKSON GLEISUNTERHALTER

Leistungsfähige vibrierende Tätigkeit. Vollständige Druckknopfbedienung. Die beste Maschine zum Anlegen und Unterhalten der Gleise. Wird von allen amerikanischen Eisenbahnen bevorzugt. Lieferbar für alle Spurweiten.

2. JACKSON UNIVERSAL

Besonders zweckmässig zum Feststopfen der Bettung. Hebewinde und automatischer Regler von Schwellen mit doppelten Stopfflächen. Druckknopfbedienung. Lieferbar für alle Spurweiten.

3. JACKSON MONORAIL

Eine vollständige hydraulische Gleisstopfmaschine. Auch besonders geeignet zum Markieren, Ebnen und Unterhalten der Gleise. Alle normale Spurweiten.

4. JACKSON HANDGLEISSTOPFMASCHINE

Elektrisch vibrierend, wird von tragbarer Kraftzentrale geleitet, die vier Gleisstopfmaschinen bedient. Umstellbare Hebel und Schaufeln für verschiedene Zwecke.

1. MANTENEDORA DE VIAS JACKSON

Intensa acción vibratoria. Sistema completo de botones para los mandos. La mejor máquina para la instalación y el mantenimiento de las vías, preferida por la inmensa mayoría de los ferrocarriles norteamericanos. Puede obtenerse en anchos de 143.5 cm o mayores.

2. JACKSON UNIVERSAL

De extraoridinaria eficiencia para el apisonado en general y de traviesas salientes. El equipo opcional incluye gatos y espaciador automático de doble traviesa. Accionada por botones. Para anchos de vía de un metro o mayores.

3. MONORRIEL JACKSON

Máquina apisonadora de funcionamiento totalmente hidráulico . . . Ideal también para nivelaciones, rasanteado y mantenimiento de las vías de patios. Para todos los anchos de vía standard.

4. APISONADORAS DE MANO JACKSON

Del tipo vibratorio-eléctrico, accionadas por una planta portátil que alimenta cuatro apisonadoras. El mango y las hojas se pueden ajustar para distintas aplicaciones.

JACKSON VIBRATORS Inc.

Railway Bookshelf

125 Jahre Deutsche Eisenbahnen (German Federal Railways, Frankfurt/Main: special issue of "Die Bundesbahn") — This jubilee issue of "Die Bundesbahn" contains two main sections: "From Adler to TEE," a short historical review of the DB and its predecessors, and "The Deutsche Bundesbahn Today," a comprehensive survey of present-day DB operations and progress by operating district. (German)

125 Jahre Deutsche Eisenbahnen — (Georg Siemans Verlagsbuchhandlung, Berlin: special number of "Glasers Annalen.") — This handsomely-produced volume contains a variety of articles of interest: "The State of Development of Machine and Electrical Technology on the DB" by Dr. Günther Wiens gives a general survey of technical developments; other articles discuss the activities of various DB organizations, including the Munich research center. Particularly of interest, in view of the attention being given to the DB in anniversary publications, is a review of technical progress on West Germany's non-Federal railways. Development of motive power and passenger equipment is covered, as well as combined rail and road or water transport and technical cooperation between European railways. A useful general reference volume. (German)

Permanent Way in Japan — 1960 (Permanent Way Society of Japan, Tokyo) — This paper-bound, large-format book of 157 pages is in effect a directory. A 20-page introduction gives a brief survey of Japanese railways today, both government and private systems. The directory section includes photographs of various permanent-way installations, interspersed among advertisements from more than 90 manufacturing firms with products covering the entire gamut of permanent-way equipment and supplies. (English)

Railway Steel Topics: Autumn 1960 (The United Steel Companies, Ltd., Sheffield) — Of particular interest to permanent way and other railway engineering personnel, this volume of "Railway Steel Topics" contains articles on permanent way of the Danish State Railways; the planning of freight car repair shops (Mexico); developments in internal combustion locomotives; replacement of rails on the Brazilian Railways; and others. Of special interest is an article on United Steel's own technical information services, which presents observations on the gathering of needed technical information that should be of considerable value to many railway administrations. (English: summaries in French and Spanish)

Introduction of Diesel Traction on the Egyptian Railways by Dr. Mostafa Khalil, Minister of Communications (UAR Egyptian Region Ministry of Communications, Cairo) — The 42 mimeographed pages of this booklet cover in considerable detail the Egyptian Republic Railways' dieselization program; they are supplemented by several extensive and detailed appendices covering special subjects. (English)

Kingdom of Saudi Arabia: Ministry of Communications (Ministry of Communications, Riyadh) — This booklet gives a comprehensive survey of the Ministry's activities; railwaymen will be chiefly interested in its 24 pages dealing with the Saudi Government Railroad and the port of Dammam. Description is thorough and well illustrated with charts and photographs. (English)

GREAT BRITAIN: A Railway Modernization Conference, which railway engineers from overseas are invited to attend, will be held in London 3–4 May. It is being organized by the Institutions of Civil, Mechanical and Electrical Engineers.

GABON: Société des Mines de Fer (SOMIFER) is considering the eventual construction of a 570-km rail line to connect a mine near Mekambo with the Atlantic port of Libreville. The line would tap reserves of 60 per cent iron ore which are being considered for development by SOMIFER. Gabon now has no rail outlet; completion of the now-building COMILOG line (IRJ, Jan., p. 42) will bring rail service close to the border of Gabon at M'binda in the Congo Republic.

JAPAN: Japanese National Railways plan to complete, this year, from 30 to 40 per cent of the new Tokaido "super-railway" between Tokyo and Osaka. The model section, between Fujisawa and Odawara, is expected to be finished this year, so it can be used for test operation of trains, speed experiments and employee training.

. . . Hitachi, Ltd., has concluded an agreement with West Germany's Alweg company for production, in Japan, of Alweg monorail trains for Japanese use.

. . . The JNR has outlined a 15-year plan to alleviate excessive crowding on its suburban and "inside Tokyo" lines. The plan involves double-tracking of some existing lines; construction of new lines; and links between the railroad and city subway system.

SOVIET UNION: Has opened a 160-km line from Murmansk to Pechenga, to provide access to large nickel ore deposits well within the Arctic Circle.

. . . Electrification of the last 418-km stretch of the East Siberian Railway from Zima to Taishet has reportedly been completed. This, in turn, completes electrification of the Trans-Siberian trunk line from Lake Baikal to Omsk.

EGYPT: Railway sleeping and dining cars operated in Egypt by the Compagnie Internationale des Wagons-Lits have been taken over by the government. Takeover of the Belgian-owned company's assets was reported to stem from differences between the United Arab Republic and Belgium arising from the Congolese situation.

CZECHOSLOVAKIA: During 1960, Czechoslovakia reportedly produced 169 electric and 121 diesel locomotives—both new records.

FRANCE: Paris' Municipal Council has agreed on the construction of a new underground line of the Paris Metro (RATP). The line will partially parallel the existing Pont de Neuilly-Porte de Vincennes line, which handled 150 million passengers in 1959. The new line will provide for the separation of suburban and local traffic during peak hours. Express trains will handle an hourly total of 50,000 passengers; construction is to be completed by 1970.

. . . The SNCF has developed a system of carrying live fish up to 1100 km, or for 24 hours. The system uses plastic sacks, filled half with water and half with compressed oxygen, and packed in cardboard cases. The soft plastic protects the fish, while their movements and those of the train reoxygenize the water during transport.

NETHERLANDS-FRANCE: The Netherlands Railways well display new hopper cars and, in cooperation with the SNCF, French piggyback equipment, at the Royal Dutch Industries Fair in Utrecht from 13 to 22 March. All equipment will be in working order. Loading and unloading demonstrations, principally for shippers, will be held daily at 10:00, 11:00, 14:00, 15:00 and 16:00.

SOUTH AFRICA: South African Railways & Harbours have just completed a £7,300,000 project for the widening, from 610-mm to 1.067-m gauge, of a 572-km line in South West Africa. The line includes a 406-km main stem from Kranzberg on the Windhoek-Walvis Bay line north to the copper-lead-zinc mine at Tsumeb; and of 93-km and 73-km branches. With growing traffic in ore and cattle resulting from postwar development of the northern part of South West Africa, the original line had become a serious bottleneck in the country's rail system. Ore for export through Walvis Bay had, for example, to be taken to Usakos for transfer to 1.067-m cars.

With the widening completed, the former narrow-gauge steam locomotives have been replaced by 1Co-Co1 diesel-electric locomotives supplied by the International General Electric Co. The new locomotives are of the U18 type powered by Cooper-Bessemer turbocharged engines.

Because of water difficulties in the arid territory, the entire South Western African system of approximately 2,350 route-km is being converted to diesel operation. More than half of 115 IGE U18 locomotives ordered for that purpose in 1958, at a cost of nearly £10,000,000, are now in use. To service them, £1,239,550 is being spent on repair and maintenance facilities, including £885,250 for the main shop at Windhoek.

. . . The Transvaal firm of Hunslet Taylor has completed the largest diesel locomotive yet built in South Africa. Designed for switching service at Broken Hill, the 1.067-m gauge unit is powered by a Cummins NRT6 engine developing 260 hp.

. . . Stipends for the study of pharmacy will be awarded to successful scholarship candidates by the South African Railways, leading to service in Railway Sick Fund dispensaries.

Dependable G-E diesel-electrics chosen to haul ore through African jungle

Seven General Electric universal model diesel-electric locomotives will soon be operating in the tropical jungles of central Africa. These 1330-hp locomotives were ordered by the French Mining Company COMILOG (Compagnie Miniere de l'Ogooue) to haul thousands of tons of manganese ore daily to a coast port 300 miles away.

From the mine site located along the Ogooue River near Franceville in the Gabon Republic, the ore will be hauled 50 miles by cableway to the railhead at M'Binda. There it will be loaded into ore cars for the 300-mile rail trip to the port of Pointe Noire.

General Electric diesel-electric locomotives were chosen to haul heavy ore trains in the extreme African climate for these reasons:

DEPENDABILITY In tropical Africa where COMILOG's locomotives will be operating, the temperature ranges up to 96° F. and the humidity reaches 100%. Annual rainfall averages 85 inches, with tornados and violent winds common from October through May. Here a locomotive meets a severe test of reliability—and G-E diesel-electrics have already proved themselves in similar conditions.

EFFICIENCY Interchangeable electrical controls and equipment proved in millions of miles of world-wide service assure maximum use of engine horsepower, ease of operation, and outstanding performance from a locomotive designed to take hard working conditions.

ECONOMY Heavy-duty 4-cycle diesel engine, specifically designed for low fuel consumption, reliability, and long life has established a standard for operating savings and low maintenance on the world's railways.

Dependability . . . Efficiency . . . Economy – just three of many reasons why COMILOG and other progressive locomotive users throughout the world rely on General Electric universal diesel-electric motive power. 135-E32

Progress Is Our Most Important Product

GENERAL ELECTRIC

LOCOMOTIVE AND CAR EQUIPMENT DEPARTMENT • ERIE, PENNSYLVANIA, U.S.A.
Represented throughout the world by the International General Electric Company
Main Office: 150 East 42nd Street, New York 17, New York, U.S.A.

Track Ballast efficiently consolidated with KANGO

ELECTRIC BALLAST TAMPERS

The Kango Electric Ballast Tamper carries out the important duty of consolidating track ballast on plain line, points and crossings.

It is a light, balanced machine easy to operate and the special tampings tools are designed for ease of entry when used on crossings.

These machines will quickly consolidate ballast and this work can be carried out without interfering with normal traffic. Kango Ballast Tampers are ideally suitable for operation off the Kango 3 kw. Diesel Generator.

THE NEW KANGO GENERATOR

the lightest 3 kw. diesel powered generator in standard production

The new 3,000-watt Kango Portable Diesel Generator is so light it can be wheeled with ease. It takes only two men to *carry* it. Weighing 250 lb., the generator has a power/weight ratio of 83.7 lb./kw. This specially designed lightweight generator—single bearing type is powered by a HATZ E.75 lightweight 4-stroke high speed diesel. The generator comes wound for either 110 volts or 240 volts DC or 50 cycles AC. The engine—complete with its unique 'down-draught' cooling system—develops an output of 6 b.h.p. at 3,000 r.p.m. at a very low weight factor.

The generator is mounted on a welded steel angle base—spring supported in carrying frame of welded steel angle, with tubular carrying handles and two 8" x 1¾" solid rubber wheels.

KANGO ELECTRIC HAMMERS LTD.

LOMBARD ROAD · MORDEN ROAD
SOUTH WIMBLEDON, LONDON, ENGLAND

(Advertisement)

Bourreuses de Ballast KANGO

LES BOURREUSES DE BALLAST ELECTRIQUES KANGO permettent de damer efficacement le ballast des voies.

La bourreuse de ballast électrique Kango effectue l'opération importante de damage du ballast des voies sur les lignes simples, les aiguilles et les croisements.

La machine légère et bien équilibrée est facile à utiliser. Les outils spéciaux de bourrage sont conçus pour donner une pénétration facile aux croisements des voies.

Ces machines permettent de damer rapidement le ballast et le travail peut être effectué sans perturber la circulation normale. Les bourreuses de ballast Kango sont idéales pour être alimentées à partir du groupe électrogène diesel Kango 3 kW.

Groupe electrogene KANGO

La nouvelle génératrice Kango est la plus légère des génératrices 3 kW de fabrication standard entraînées par diesel.

Ce groupe électrogène alimente facilement quatre bourreuses de ballast Kango travaillant en même temps. Un homme suffit pour le déplacer sur roues et deux hommes pour leporter, étant donné qu'il ne pèse que 111,5 kg. Ce groupe est entraîné par le diesel Hatz E.75, moteur léger bien connu.

Ce groupe existe en version 110 volts ou 240 volts courant continu ou courant alternatif 50 Hz.

Apisonadora de Balasto KANGO

LAS APISONADORAS ELECTRICAS DE BALASTO KANGO permiten consolidar eficazmente el balasto de las vías.

Las apisonadoras eléctricas de balasto KANGO efectúan la importante operación de consolidar el balasto en las vías corrientes, agujas y cruces.

La máquina ligera, bien equilibrada, es de fácil manejo, y las herramientas especiales para apisonar han sido diseñadas para su fácil penetración cuando se emplean en los cruces de vías.

Estas máquinas hacen factible la pronta consolidación del balasto, labor que puede llevarse a cabo sin interrumpir la circulación normal. Las apisonadoras de balasto KANGO están idealmente adaptadas para su funcionamiento por medio de los grupos electrógenos diesel KANGO 3 kW.

Grupo Electrogeno KANGO

El nuevo generador KANGO es el más ligero de los generadores de 3 kW de fabricación standard mandado por diesel.

Este grupo electrógeno alimenta con facilidad cuatro apisonadoras de balasto KANGO trabajando al mismo tiempo. Un solo hombre puede transportarlo sobre ruedas o puede ser llevado por dos hombres debido a su poco peso de 111.5 kgs. El motor es el conocido HATZ E.75 diesel, de peso ligero.

Puede ser suministrado para 110 volts o 240 volts. C.C. o 50 ciclos C.A.

Der KANGO-Schotterstampfer

Streckenschotter wird mittels des elektrischen Schotterstampfers der Firma KANGO wirksam verdichtet.

Der elektrische Schotterstampfer vollführt die bedeutende Leistung, den Streckenschotter auf offener Strecke und an Weichen und Kreuzungen zu verdichten.

Es handelt sich hierbei um eine leichte, ausbalancierte Maschine, die einfach zu bedienen ist. Die besonderen Stampfwerkzeuge sind so beschaffen, dass sie leicht zu benutzen sind, wenn sie an Kreuzungen gebraucht werden.

Diese Maschinen verdichten den Schotter auf schnellem Wege. Die Arbeit kann ausgeführt werden, ohne dass der Normalverkehr gestört wird.

Die KANGO-Schottermaschinen arbeiten in idealer Weise in Verbindung mit dem 3kw. KANGO-Dieselgenerator.

Der KANGO-Generator

Der neue KANGO-Generator ist der leichteste mit einem 3kw. Dieselmotor ausgestattete Generator in Standardausführung.

Dieses Gerät versieht mit Leichtigkeit 4 KANGO-Schotterstampfer gleichzeitig mit Energie. Da sein Gewicht nur 11,5 kg betragt, kann es von einem Mann gefahren und von 2 Männern getragen werden. Der Motor, der hier Anwendung findet, ist der bekannte Hatz-Leichtgesichts-Diesel E.75.

Das Gerät kann für Stromstärken von 110 und 240 Volt Gleichstrom und 50 Perioden Wechselstrom geliefert werden.

KANGO ELECTRIC HAMMERS LTD.

LONDON, ENGLAND

Short Lines . . . . . .

". . . To Speak of Many Things" — As predicted in this column last month ("The Time Has Come, The Walrus Said . . .") we are on about ships (p. 24) this month; it came about a bit sooner than I'd expected. Sails and sealing wax will be deferred for a while.

Trainsets, Continued — Also as promised last month, we have something on two new Swiss trainset designs (p. 18). While my comments about the disappearance of the locomotive still stand, I can reassure myself with the fact that, bearing in mind the horsepower of both the Bodensee-Toggenburg and TEE power cars, they would have been called locomotives not very long ago. Speaking of the TEE sets, I had the pleasure of visiting them at SIG's works a few weeks ago. From what I saw of them under construction, they should establish a new peak for the already fine coachwork of existing diesel TEE sets.

What? No Brunnhilde? — With reference to the visit mentioned above, does any rolling-stock plant in the world compare with SIG for sheerly spectacular scenic setting? Looking out of the window at the Falls of the Rhine (SIG is almost on top of them) I could only think that I'd wandered inadvertently into a stage set for a Wagner opera.

Complete With All Accessories — It is a bit intriguing to find that top-hatted William Wilson, the driver of "Der Adler" on Germany's first steam railway run from Nürnberg to Fürth (for a more up-to-date survey of West Germany's railway network see p. 26) was supplied along with the spare parts by Britain's Stephenson works. Evidently Mr. Wilson didn't object, for we are told that he died at a ripe old age in Germany after having served as a top officer of the firm.

Historical Footnote — When I look at one of the many finely-engineered track maintenance machines in use these days, ("New Products," p. 40) I am reminded that the labor-saving nature of heavy machinery on railways was recognized long ago in the naming of the machines. In England the steam-shovel was for years called a "steam navvy" (or laborer), while the prevalence of Irish immigrants in railway construction crews in the US led to the name "steam Paddy." Starting on page 34 this month's IRJ devotes considerable space to permanent-way and construction matters, in conjunction with the international exhibition of machinery to be held at Elst, Holland, later this month—20 to 25 March. IRJ will be there, and we look forward to meeting you at our booth.

World Poll to End All World Polls — As its contribution to recondite scholarship, this column hereby opens the balloting for the title of "The most useless locomotive ever designed." Candidates, when otherwise unbelievable, should be accompanied by working (or non-working) drawings.

Prototype and Promise: II — Starting this month some changes on the editorial side will bring new faces and new talents to the job of producing a steadily-improving IRJ; at the same time the changes will enable us to broaden and to deepen our coverage of world railway affairs.

David A. Beadle

WORLD POLL

Containers Help Meet Freight Competition

The container is playing an increasing role in freight traffic on the railways of the world. This month International Railway Journal surveyed a number of the world's leading railways regarding both the present use of containers and the railways' own feeling about the future of this mode of freight transport.

Le container joue un rôle de plus en plus important dans le service de marchandises des chemins de fer. L'International Railway Journal a étudié ce mois-ci les expériences des sociétés les plus importantes au sujet de l'utilisation actuelle des containers et les impressions des sociétés elles-mêmes au sujet de l'avenir de ce mode de transport.

Der Behälter spielt im Güterverkehr der Eisenbahnen in der ganzen Welt eine immer grössere Rolle. International Railway Journal hat in diesem Monat verschiedene internationale Eisenbahnen befragt über die heutige Verwendung der Behälter und über ihre eigene Meinung hinsichtlich der Zukunft dieser Art der Güterbeförderung.

El container juega un papel cada vez más importante en el tráfico de cargo de los ferrocarriles del mundo entero. Este mes la International Railway Journal ha estudiado la experiencia de unos ferrocarriles importantes del mundo en cuanto al uso actual de containeres así como sus opiniones sobre el futuro de este modo de transporte.

●

• **Austrian Federal Railways:** 3400 containers are in service, average capacity one ton, 1.45 m³. Tonnage handled in 1959 was 40,673, average length of haul 248 km; 1958 figures were 37,505 tons, 250 km. ÖBB interchanges containers with other railways but not with other modes of transport, handles privately-owned special containers. Standard containers measure 1450 × 800 × 900 mm; 1650 × 950 × 1300; 1900 × 1100 × 1430. Traffic comprised 7.47 per cent of less-carload freight in 1959, and ÖBB plans to extend container service. "Container traffic is enjoying an increasing demand."

• **Bern-Lötschberg-Simplon:** Began offering container service in 1951. Owns only five containers but interchanges with other railways and modes of transport, and also handles containers owned by private shippers. The five owned containers have a capacity of one ton, 2 m³. Highway pickup and delivery are provided by private firms. Plans no extension of its own ownership but eventual increase may come from private owners. "Containers may help the railways to combat transportation by road, but the lorries themselves are enabled to use the containers as well."

• **CF du Congo Superieur aux Grands Lacs Africains:** Began container service at the end of 1952, now has 44 containers with an average capacity of 4.2 tons, 7.38 m³. Two types of containers are used, measuring 2300 × 2100 × 2226 mm and 2100 × 2100 × 1850 mm. Does not interchange its own containers, but does handle containers of private firms. The system is a mixed one of road, rail and water transport, and containers are used primarily for shipments between Stanleyville and Usumbura, 1494 km with three transshipments en route. No present plans to expand service.

JAPAN

• **Danish State Railways:** Uses three types: type A measures 1470 × 820 × 950 mm inside; type B, 1650 × 950 × 1300–1320; type C, 1900 × 1098 × 1460. Interchanges with other railways and carries private containers, does not interchange with other means of transport. Containers in use number 450 of type A, 1300 type B, and 50 type C. Container service has been provided since 1943, and the system plans to extend the service: "We find the container is an excellent means of combating road competition, and customers are using containers to a steadily-increasing extent."

• **East African Railways and Harbours:** Began container service in 1955, now has 13 containers including two experimental units. Average capacity is four tons, 12.5 m³. Average length of haul exceeds 1600 km. The system uses its own containers in both rail service and its own road transport operations, and also handles two refrigerated containers owned by a private shipper. Containers measure 2950 × 2200 × 1895 mm. Traffic to date is a negligible part of the total, but is expanding; four refrigerated and two road-rail containers are on order, and "We are interested in the development of the use of containers . . . and shall continue experiments in this direction."

• **German Federal Railways:** Began service with small containers in 1926; large containers were used to a limited extent beginning in 1930, and service with large trailer-hauled containers began in earnest in 1950. As of December 1960, DB-owned containers included 84,946 small con-

CONTINUED ON PAGE 50

IRELAND orders 15

GENERAL MOTORS LOCOMOTIVES

GENERAL MOTORS OVERSEAS OPERATIONS

Division of General Motors Corporation, New York 19, N.Y., U.S.A. Cable Address: Autoexport

ASSOCIATE BUILDERS: AUSTRALIA—The Clyde Engineering Co. Pty., Ltd., Sydney, N. S. W. BELGIUM—LaBrugeoise et Nivelles, St. Michel-lez-Bruges • GERMANY—Henschel Werke, GmbH, Kassel • SOUTH AFRICA—Union Carriage & Wagon Co. (Pty.) Ltd., Nigel, Transvaal SPAIN—Material y Construcciones, S. A., Barcelona • SWEDEN—Nydqvist & Holm Aktiebolag, Trollhattan

LOCOMOTIVE PLANTS: Electro-Motive Division of General Motors, La Grange, Illinois, U.S.A. General Motors Diesel Limited, London, Ontario, Canada

General Motors subsidiaries, branches or representation throughout the world

GM DIESEL POWER

GENERAL MOTORS LOCOMOTIVES

World's Highest Standard – 270 to 1950 H. P.

CANADA'S FIRST AUTOMATIC YARD

Moncton Yard on the Canadian National Railways

Quick and efficient movement of freight through Moncton, N.B., is vital to the economy of the Atlantic provinces.

To further ensure on-time delivery of freight, the Canadian National Railways chose Class-Matic,® the GRS system of yard automation. Yard time will be reduced as much as 75%.

Retarders are all-electric, to ensure year-round operation; automatically controlled, to ensure safe coupling speeds.

Electronic analog computers make split-second calculations to classify thousands of cars swiftly and accurately.

TOOLS FOR TRANSPORTATION

GENERAL RAILWAY SIGNAL COMPANY

G.R.S. TRADING CORPORATION

P.O. BOX 600, ROCHESTER 2, NEW YORK U.S.A.

(Advertisement)

RÉSUMÉ

La première gare automatique au Canada. La gare des Canadian National Railways à Moncton.

Le passage rapide et efficace des marchandises par Moncton, N.B. est vital pour l'économie des Provinces Atlantiques.
Afin d'assurer davantage la livraison ponctuelle des marchandises, les Canadian National Railways ont choisi Class-Matic*, le système GRS pour l'automation des gares.
Les temps au chantier se réduit de 75%.
Le rails-freins sont entièrement électriques, pour assurer le fonctionnement pendant toute l'année; ils sont commandés automatiquement, pour assurer la sécurité des vitesses d'accouplement.
Des computateurs analog électroniques font des calculs en moins d'une seconde, permettant de classer de milliers de wagons avec rapidité et précision.

RESUMEE

Der erste automatische Bahnhof in Kanada. Der Moncton Bahnhof der Canadian National Railways.

Eine schnelle und wirksame Güterbeförderung durch Moncton N.B. ist lebenswichtig für die Wirtschaft der atlantischen Provinzen, Um rechtzeitige Güterlieferungen weiter zu sichern, haben die Canadian National Railways Class-Matic*, das GRS System für Bahnhofsautomation, gewählt, Die Zeitdauer auf dem Bahnhof wird damit bis zu 75% vermindert.
Die Bremsschienen sind ganz elektrisch, um den Betrieb durch das ganze Jahr zu ermöglichen; sie werden automatich kontrolliert, um zuverlässige Kupplungsgeschwindigkeiten zu sichern.
Elektronische analog Rechenmaschinen machen Berechnungen in weniger als einer Sekunde. um Tausende von Wagen schnell und pünktlich einzuteilen.

RESUMEN

El primer patio automático en el Canadá El patio Moncton de los Ferrocarriles Nacionales Canadienses

El despacho rápido y eficiente de los trenes de carga en el patio de Moncton, N.B., es vital para la economía de las provincias del Atlántico. Para asegurar la prontitud de esos despachos, los Ferrocarriles Nacionales Canadienses decidieron instalar en el patio un sistema de automatización Class-Matic GRS, logrando así reducir el tiempo necesario hasta en un 75%.
Los retardadores son totalmente eléctricos para asegurar un funcionamiento constante durante todo el año, y están automáticamente controlados para obtener velocidades seguras de acoplamiento.
Las calculadoras electrónicas clasifican miles de vagones con increíble rapidez y precisión.

TOOLS FOR GRS TRANSPORTATION

World Market

▶ *Antofagasta (Chili) & Bolivia*—Has ordered six general-purpose 1310-hp diesel-electric locomotives from General Motors Overseas.

▶ *Argentine State Railways (EFEA)*—Have ordered from International General Electric, at a cost of $1,400,000 US, equipment to enlarge two existing substations and build a new substation to furnish electric power for the F C General Bartolomé Mitre in Buenos Aires. General Electric Argentina, SA, a GE subsidiary, will install it.

▶ *Bolivia*—A government "Plan of Development Priorities" includes $3,400,000 for purchase of parts and materials and "certain urgent works" for railroads. The projects are to be financed through the Inter-American Development Bank, 801 - 19th St., N.W., Washington, DC, USA, from which further information may be obtained.

▶ *British Railways*—The London Midland Region has ordered from Plasser Railway Machinery (GB), Ltd., 14 Plasser-Theurer "Plasser-matic" VKR-04 hydraulic combined lifting, leveling and tamping machines, with spare parts and accessories. The North Eastern Region has ordered five similar machines from the same manufacturer.

▶ *Burma Railways*—Have received from the World Bank a 16-year loan equivalent to $14 million US, for purchase of diesel locomotives, rail cars, spare parts and shop equipment. The purchases are part of a general four-year (1961–64) modernization and rehabilitation program.

▶ *Ceylon Government Railway*—Has ordered two general-purpose 1425-hp diesel-electric locomotives from General Motors Diesel, Ltd., Canada.

▶ *Danish State Railways (DSB)*—Have begun to receive the first of 45 diesel-electric locomotives of a new series (MX) being built by Nydqvist & Holm Aktiebolaget, Tröllhattan, Sweden. Each of the new locomotives is powered by a General Motors 567C 12-cylinder, 1425-hp engine; is 18.3 meters long; weighs 88.4 metric tons; has axle load of 16 metric tons, and maximum speed of 133 km/h. Delivery of the full order will be completed in 1962.

▶ *Eastern Bengal Railway (Pakistan)*—Has ordered 21 general-purpose 875-hp diesel-electric locomotives from General Motors Overseas.

▶ *Iranian State Railways*—Will use part of a $15,000,000 Eximbank credit to the Iranian government to finance purchase of locomotives and railcars from US manufacturers.

▶ *Iraqi Republican Railways*—Have invited bids for construction of bridges and culverts between Ghubaishiyah and Maqil, 59.5 km, on the Baghdad-Maqil-Um Qasir standard-gauge line. Specifications are available from the Directorate General of Railways, Baghdad.

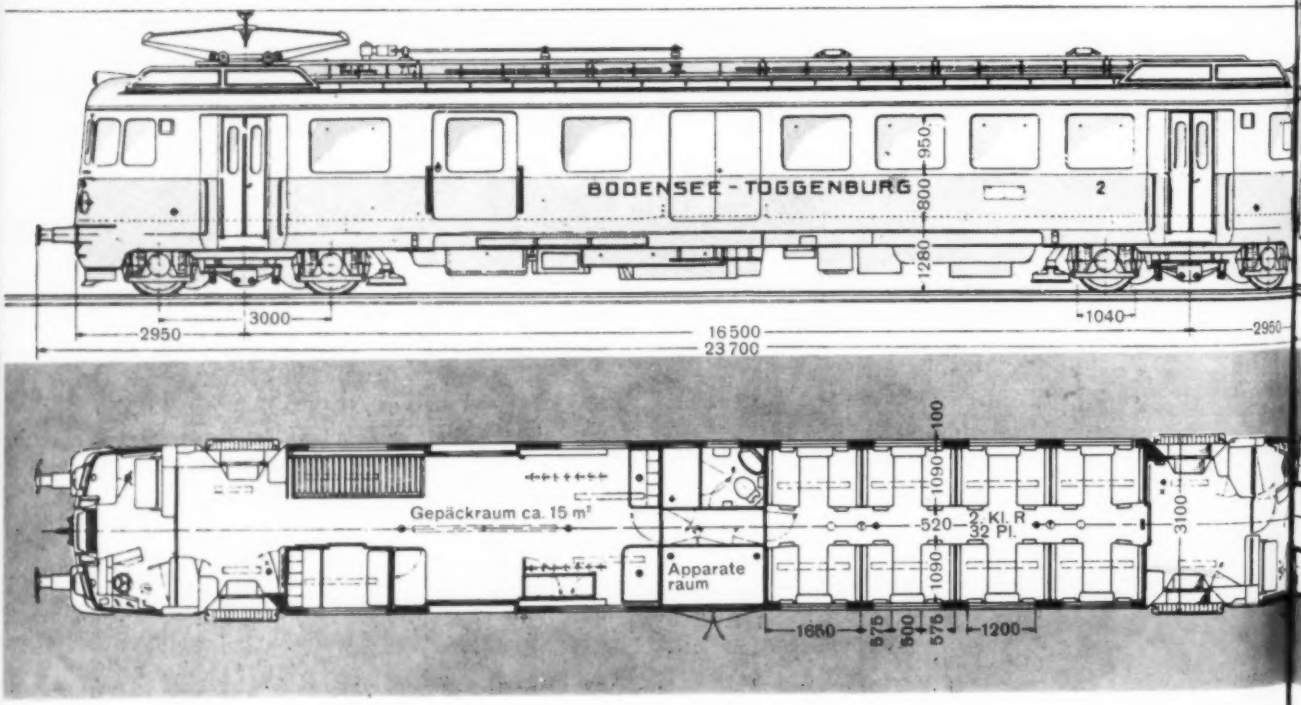
▶ *Moçambique Harbours, Railways and Transport*—The general storekeeper, Lourenço Marques, will receive bids until 29 March for 11 two-axle, 1.067-meter-gauge passenger coaches.

CONTINUED ON PAGE 53

Swiss R

A new four-car electric train set—with one of the most powerful multiple-unit motor cars ever built—has just gone into service in Switzerland. The new train, which has a driver's cab at each end to avoid terminal switching, is designed for fast turnaround in push-pull shuttle service. It is planned for maximum passenger comfort, and engineered to maintain scheduled speeds with a high passenger payload over heavy grades on the Bodensee-Toggenburg and Swiss Federal Railways (SBB).

Within the next few months, the SBB will put into TEE service four other new train sets, each designed to operate on four different types of electric current —two AC and two DC. These five-car trains will run between Paris–Milan and Zürich–Milan. They are briefly described on pages 22 and 23.



Railways Get New Trainsets

The B-T train is designed to make a daily round trip, in 3.5 hours each way, between Romanshorn and Luzern, 162 km. It will be operated jointly by the privately-owned Bodensee-Toggenburg Railway—which celebrated its 50th anniversary last year—and the Swiss Federal Railways (Schweizerische Bundesbahnen). For that reason, the motor-baggage car, the buffet-coach, and another coach with driver's cab were purchased by the B-T. The fourth car is owned by SBB and furnished in exchange for operation of the train over state railway lines.

The complete train is 95.535 meters long; weighs 165.5 tons empty; 185 tons loaded. It has 241 seats, including folding seats and those in the buffet section, and accommodates another 150 standing passengers. Its 2800-hp traction motors operate on 15-kV alternating current at $16^2/_3$ cycles. They are designed for speeds of 75 km/h with a total train weight of 300 tons on two per cent grades; of 58 km/h with 150 tons on five per cent

CONTINUED

Nouvelles rames suisses

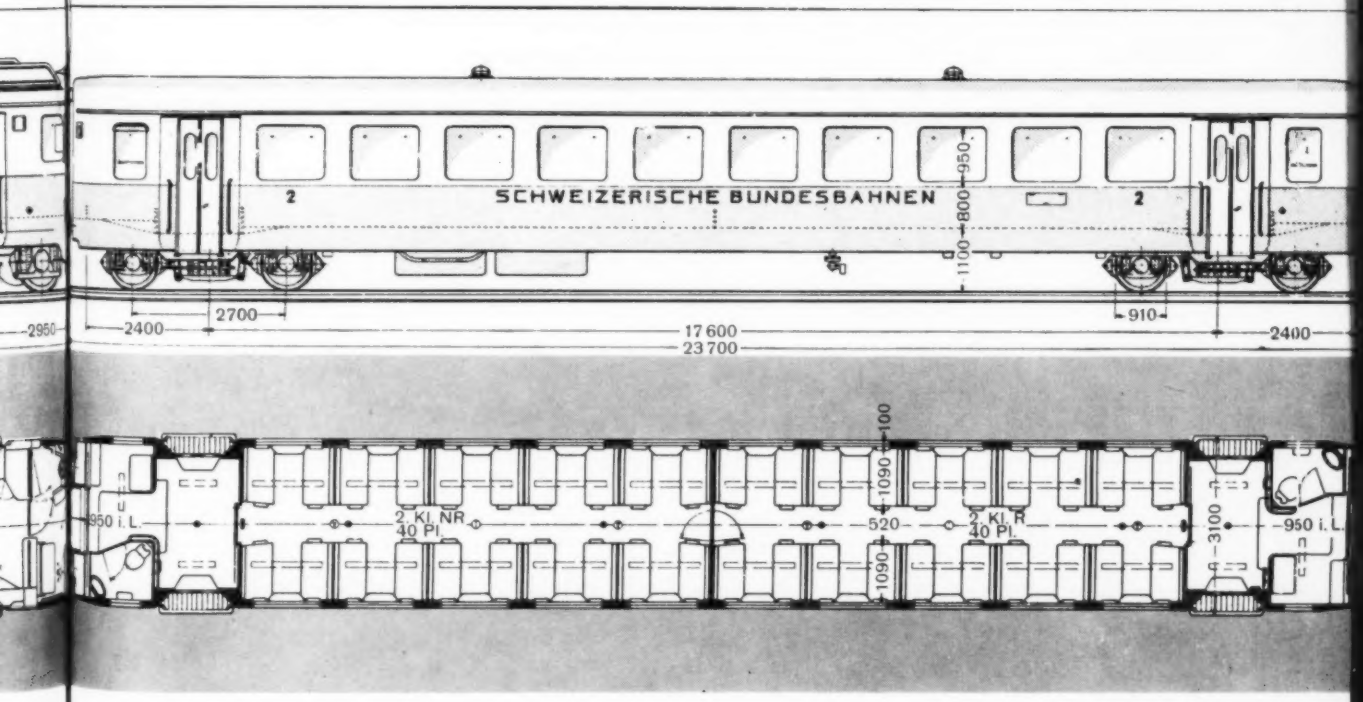
Dans le domaine de la traction électrique deux rames de conception suisse, pour des services bien différentes ont attiré l'attention mondiale. La première, un train-navette fut mise en service en automne 1960 sur la ligne Bodensee-Toggenburg pour le service Romanshorn-Luzern, exploité conjointement par la BT fédérale suisse et la Südostbahn.

Neue Schweizer Triebwagenzüge

In dem elektrischen Sektor konzentriert sich die Aufmerksamkeit auf zwei schweizer Triebwagenzug-Modelle für sehr verschiedene Dienste. Der erste, ein Pendelzug, wurde in Herbst 1960 bei der Bodensee-Toggenburg-Bahn in Betrieb genommen für die Romanshorn-Luzern-Strecke, die zusammen von der BT, der Schweizerischen Bundesbahn und der Südostbahn betrieben wird.

Nuevas ramas suizas

Dos ramas eléctricas suizas para fines muy diferentes llaman nuestra atención. La primera, un tren lanzadera, se puse en servicio durante el otoño de 1960 en la Bodensee-Toggenburg Bahn para el servicio Romanshorn-Lucerna explotada por la BT, los Ferrocarriles Federales Suizas y la Südostbahn.



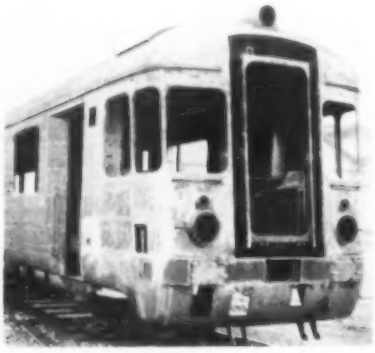
SWISS TRAINSETS

CONTINUED

grades. For safety in descending such heavy grades, the train has both mechanical and electrical brakes.

Car-by-car make-up of the train is as follows:

Car No. 1 — Motor car. Built for B-T. Includes cab, motors, apparatus room, 32-seat second-class passenger compartment, four folding seats, toilet and entrance vestibule. The baggage section has special ceiling racks from which bicycles may be hung by their forewheels, and a sunken tub with wooden slat floor for small livestock. Over-all length of the car is 23.7 meters; tare weight, 70 tons.



Welded car bodies are light, strong and safe. Caisses soudees: legères, fortes, sécurité. Geschweisste Karosserien; leicht, fest, sicher. Cajas de coches soldadas, ligeras y fuertes.

Car No. 2 — Second-class coach, provided by SBB. Includes 80 second-class seats, four folding seats, two entrance vestibules and two toilets. Length, 23.7 meters; weight, 30 tons.

Car No. 3 — Buffet-coach. Built for B-T. Includes kitchen, 28-seat buffet section, 32-seat second-class passenger section, two folding seats, vestibule and toilet. Length, 24.1 meters; weight, 33.5 tons.

Car No. 4 — Coach with driver's cab. Built for B-T. Includes driver's cab for reverse-direction operation, 24 first-class and 31 second-class passenger seats, four folding seats, two vestibules and two toilets. Length, 24.035 meters; weight, 32 tons.

The heavy grades over which the train operates made it essential to use the lightest construction consistent with safety. The tubular motor car shell, for example, weighs only 11 tons; it is made of reinforced thin-walled tinplate steel, welded throughout. The interior is treated with 25-mm spray asbestos for protection against noise, temperature and corrosion.

The four parallel-connected traction motors are of the 10-pole compensated monophase type, used for some years on the SBB.

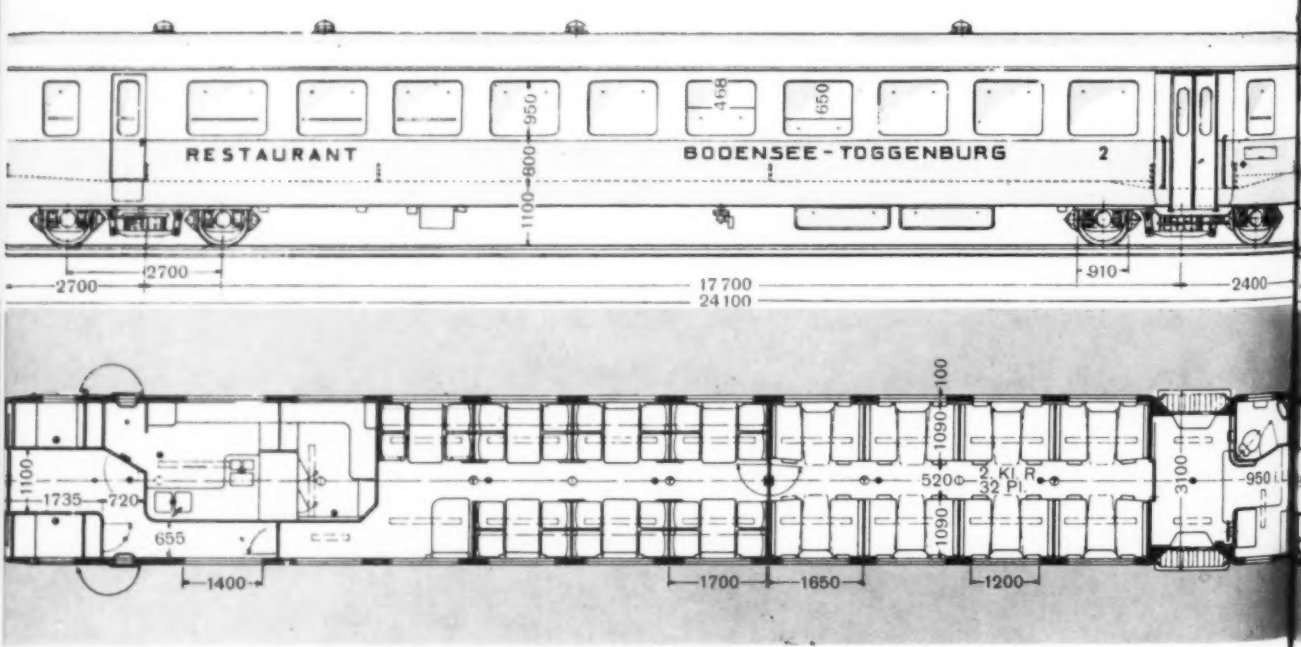
The motors weigh 2540 kg each, and have the following characteristics:

	Continuous	Maximum
Shaft performance (kw)	450	...
Torsional moment	400	860
Amperage	1400	2500
Voltage	380	560
Rpm	1120	1600

The transformer between the 15-kV, $16^2/_3$-cycle overhead line and the traction motors, secondary electrical apparatus and train-heating equipment is under the motor-car floor. Traction motors are switched by a low-voltage step switch with 28 positions—an unusually high number. Motors and transformers are oil-cooled, with three double fan groups.

The all-welded SIG motor bogies have torsion spring suspension, with automatic train-stop magnets elastically fixed and coil springs on the axle boxes, which are automatically greased. The trailer bogies are of the Schlieren lightweight type.

Because descent of the Bodensee-Toggenburg's five per cent grades requires long, hard braking, the train has two sets of brakes. All axles are equipped with pneumatic Bühle-Oerlikon automatic and non-automatic brakes. In addition, the motor axles also have electric con-



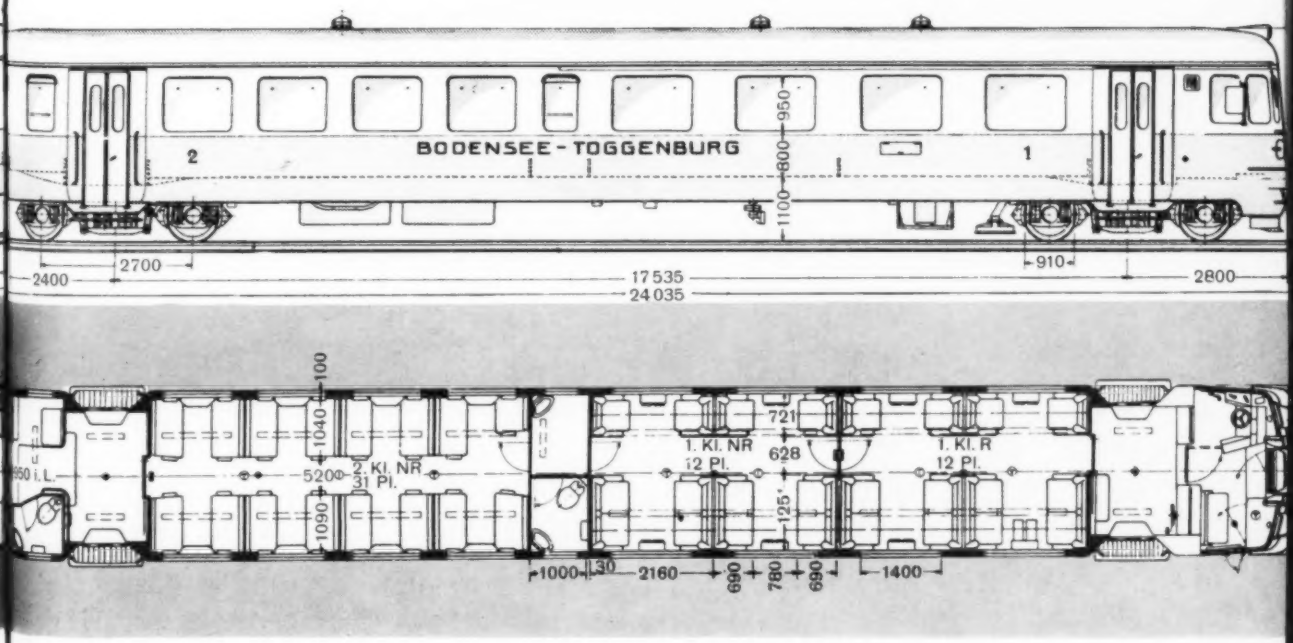
tinuous current resistor brakes—current being generated by the traction motors. The pneumatic brakes give full safety on steep grades; the electric brakes permit cheaper braking, with less wear on brake shoes and flanges, on long slopes with lesser grades. A feature of the braking system is the placing of the resistor on the motor-car roof, where speed gives good cooling. The system reaches a continuous capacity of 1000 kw, with a short-time overload of 2000 kw.

The coaches are designed primarily for passenger comfort. This is of special importance to the Bodensee-Toggenburg, because the line draws about two-thirds of its total revenue from passengers—whose average journey, however, is so short that the railroad has to face fierce highway competition.

Thus, the coach interiors are described as "friendly, practical and modern." There are no compartments. In the first-class section, there are facing single seats on one side of the corridor; facing double seats on the other. Second-class sections have facing double seats on each side of the center corridor. First-class chairs are upholstered in blue-black striped fabric, and have adjustable seats and backs. The floor is carpeted. Second-class seats are also upholstered, but with plastic-leather covers. Car interiors are finished with

CONTINUED

Interior design of Bodensee-Toggenburg train set is planned for passenger comfort.
Rame Bodensee-Toggenburg spécialement désignée pour le confort des passagers.
Innenausstattung des Bodensee-Toggenburg-Zuges entspricht heutigem Reisekomfort.
Interior de la rama Bodensee-Toggenburg, diseñado para el confort de los pasajeros.



New All-Electric TEE Sets Will Ru

noise-absorbing, easy-to-clean plastics and light metal alloys.

Windows, 1.4 meters wide, are of warmth-reflecting green-tinted glass, with venetian blinds. Double-winged folding vestibule doors can be opened electro-pneumatically by the driver of the train or by passengers, and closed automatically to shorten stops at stations.

The cars are warmed by hot air, heated electrically and blown by noiseless fans into the coaches through holes in heating ducts along the walls. In summer, fresh air is blown in, but is warmed a little first if the outside temperature is less than 18 degrees C. Both heating and cooling are controlled by automatic thermostats. Air escapes through the unavoidable cracks near doors and windows. In the absence of any larger outlets, the forced inflow of air tends to build up a slight interior pressure, which eliminates drafts.

Lighting—especially important because of the B-T's 17 tunnels— is by fluorescent tubes, operating on 220-volt AC.

A loudspeaker system, with 120-watt transistor amplifier, permits either the driver or guard to give passengers information about stations, train delays, and so on. It can also be used for playing recorded music during excursion trips. There are exterior loudspeakers on both sides of the train for use at stations where no local public-address system is available. A service loudspeaker system connects driver's cabs with guard's compartment.

The three B-T cars included in the new train set were built by the Swiss Industrial Co. (SIG), Neuhausen am Rheinfall, and the Swiss Car and Elevator Co., Schlieren-Zürich, with electrical equipment by Brown, Boveri of Baden. The loudspeaker system was furnished by Movomatic S.A., Neuchâtel.

The 51-year-old Bodensee-Toggenburg —one of Switzerland's many privately-owned railways—runs from Romanshorn, on the Bodensee (Lake of Constance) south through the city of St. Gallen, to Lichtensteig and Nesslau.

In a total length of 55.6 km, it has 14 stations, 11 bridges and viaducts more than 100 meters long, and 17 tunnels. The longest bridge is the Sitter River viaduct, 365 meters long and 100 meters high—Europe's highest railway viaduct built of brick arches with a 120-meter iron middle span. The longest tunnel is the Wasserfluh, 3.5 km in length.

The B-T currently operates six electric locomotives, two electric motor cars, three buffet coaches and 89 freight cars. It employs 270 people. In 1959, it carried 4,500,000 passengers.

Trains électriques TEE

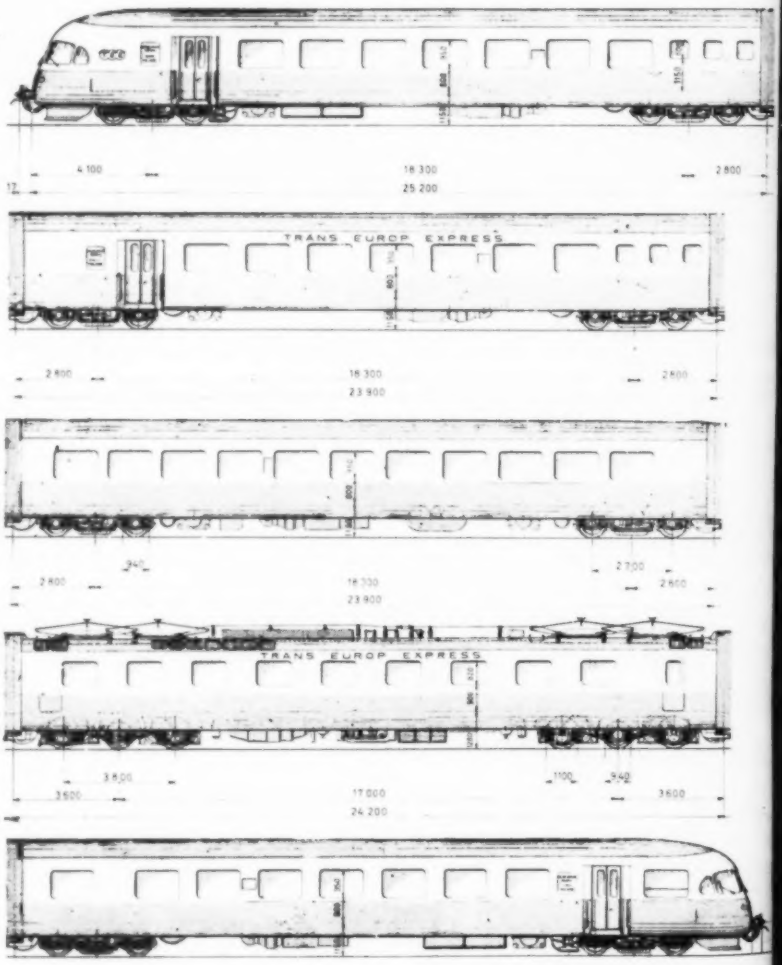
Pour combler les lacunes dans le réseau actuel des services express transeuropéens, les chemins de fer fédéraux suisses mettront en service l'été prochain quatre rames électriques. La force motrice pour le service sur les lignes suisses, italiennes et françaises a été spécialement désignée pour son utilisation dans quatre systèmes électriques différents.

Elektrische TEE Züge

Zur Füllung der Lücken in dem heutigen Bahnnetz der Trans-Europ Express Dienste wird die Schweizerische Bundesbahn diesen Sommer vier elektrische Triebwagenzüge in Betrieb nehmen. Für den Dienst auf den Strecken in der Schweiz, in Italien und Frankreich wurden Energie-Aggregate für den Betrieb in vier Stromsystemen entwickelt.

Trenes TEE eléctricos

A fin de completar la red del servicio Trans-Europ Express los Ferrocarriles Federales Suizas pondrán en servicio, durante el próximo verano, cuatro ramas eléctricas. Estas ramas tendrán tracción eléctrica y podrán servir, en las líneas de los Ferrocarriles Federales Suizas, de los Ferrocarriles del Estado Italianos y de los Ferrocarriles Francesas, con cuatro diferentes sistemas eléctricos.



M
A
R

1
9
1

XU

On Four Currents for Zürich-Milan, Milan-Paris Services

To fill gaps in the present Trans-Europ Express network, two new services will commence operation in July, Zürich-Milan and Paris-Milan. Because of the gradients on both routes and speeds required for the schedules, it was decided that electric traction would be preferable to diesel traction. Both routes also involve lengthy tunnels (the Gotthard and the Simplon) and the use of electric trains will obviate any problem that might arise from diesel fumes. The adoption of electric traction has, however, entailed a design capable of operating on four different electric systems—two AC and two DC.

Four trains are under construction for the operating system—the Swiss Federal Railways—each one costing four million Swiss francs. Each train will consist of five cars with a driving cab at each end of the set. The general design of the cars follows that of the latest Swiss Federal passenger vehicles. All the electrical equipment is concentrated in one car, which weighs 96.5 metric tons. This runs on two six-wheeled bogies which have a total of four axles motored with DC traction motors having a total output of 3400 hp. Four pantographs are mounted on the roof of this car—one for each current: 1500 volts DC, 3000 volts DC, 15 kv AC ($16^2/_3$ cycles) and 25 kv AC (50 cycles). Direct current provides no problem for feeding to DC traction motors. The alternating current is rectified by dry silicon rectifiers. Special devices allow for the fully automatic working of all traction apparatus, irrespective of the current supply. Although the electrical equipment involved is complex, the Swiss Federal considers that it will be unnecessary to provide an electrician on board.

For the auxiliaries—air-conditioning, cooking, heating, lighting and the signaling and security circuits—two DC motors will drive an alternator which, in turn, will provide three-phase current. The DC motors will be fed in the same way as the traction motors.

The design of the passenger accommodation and layout of the cars has been based on experience gained with the joint Swiss-Dutch diesel-electric TEE trains. As a result it was decided that all passenger saloons would be of the center aisle type; this was preferred to compartment type accommodation. Seating consists of facing seats, two on one side of the aisle and one on the other. The configuration is similar to that employed in the latest Swiss Federal first-class cars used for domestic traffic.

The offset corridor connections used on the diesel-electric TEEs are also being used on the new trains. However, more space is being allocated in the vestibules for baggage storage and entrance doors are provided at one end of the car only. The toilets (two per car) are located at the opposite end to the entrance doors.

The dining accommodation is more spacious than that on the diesel-electric sets, as it was found that at times it was inadequate on the latter. The dining saloon seats 48, with tables for four on one side of the aisle and tables for two on the other side. A small bar, with nine seats, is also provided at one end of the dining car. Total passenger accommodation is 126.

Each train will be 122.8 meters long and weigh approximately 244 metric tons. Maximum speed will be 160 km/h.

Composition of each train will be as follows:

Car 1 — Cab, wardrobe/baggage space, entrance vestibule, 42 seat passenger saloon, toilets (2). Length: 25.2 meters. Tare weight: 36.5 metric tons

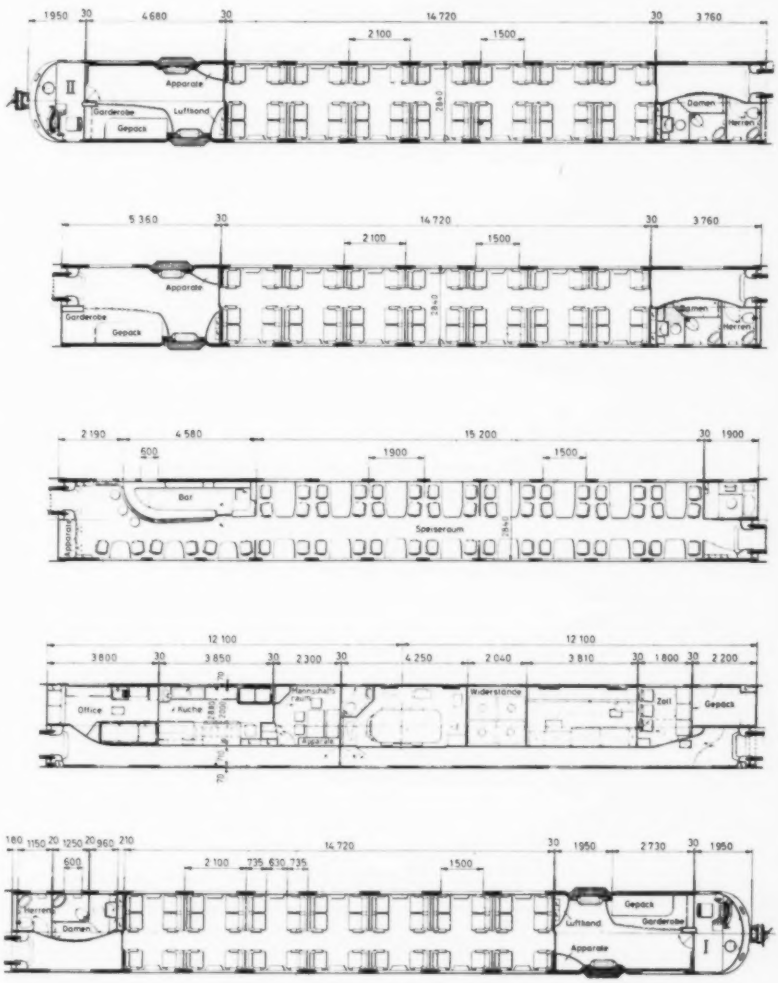
Car 2 — Wardrobe/baggage space, entrance vestibule, 42 seat passenger saloon, toilets (2). Length: 23.9 meters. Tare weight 35.5 metric tons.

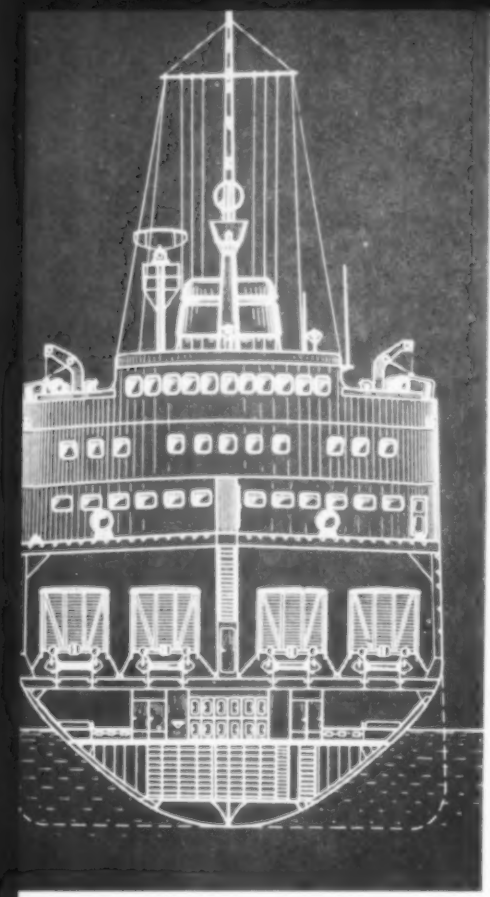
Car 3 — Bar, dining saloon seating 48. Length: 23.9 meters. Tare weight: 39 metric tons.

Car 4 (Power Car)—Kitchen, office, crew room, electrical apparatus rooms, customs officers' compartment, baggage compartment. Length: 24.2 meters. Tare weight: 96.5 metric tons.

Car 5 — Toilets (2), 42 seat passenger saloon, entrance vestibule, wardrobe/baggage space, cab. Length: 25.2 meters. Tare weight: 35.5 metric tons.

Construction of the trains is in the hands of SIG, Oerlikon and Brown Boveri.





USSR: Trans-Caspian

By Arshavir A. Avetikian

The growing importance of railway traffic between the Central Asian republics of the Soviet Union and the cities of the Crimea and Caucasus has led to the planning of a railway car-ferry route from Krasnovodsk to Baku on the Caspian Sea. Present facilities require either expensive and time-consuming transshipment of freight for the Caspian crossing or the alternative of a roundabout all-rail route. Between Kagan and Baku, for example, the rail distance is 4513 km with an average transit time of 20.5 days; when the ferry route is placed in service in late 1961 or early 1962, the same journey will be cut to 1528 km, with a transit time of four days and a reduction of transport costs from 85 to 36.5 rubles. In addition to the necessary piers and other shore structures, the project calls for the building of five or six modern diesel-powered ferries specially equipped for the difficult navigation conditions found on the Caspian. The first of the ships—measuring 133 meters in length and having a speed of 16 knots—has already been launched at the Sormovo Plant in Leningrad. At IRJ's request Soviet railway engineer and journalist A. A. Avetikian interviewed top marine and shipbuilding authorities concerning details of the project.

What necessitates the construction of a railway ferry on the Caspian Sea between Krasnovodsk and Baku?

The Krasnovodsk-Baku railway ferry is one of the projects of the Seven-Year Plan. This railway ferry, the longest in the Soviet Union, will be equipped according to the latest word in engineering. The ferry will join up the railway systems of the Transcaucasus and Central Asia.

The question of organizing the shipment of freight across the Caspian Sea in railway cars was first raised in the prewar period. However, in that period there was no special necessity for building sea ferries. At present the situation has changed. Today the problem of developing intercommunication between various modes of transport has acquired primary importance, because a considerable volume of freight shipments is carried out along combined railway and water routes. This necessitates the reloading of the freight at the sea ports from one type of transport to another. This is both expensive and labor-consuming.

The stepping up of the rate of reloading work at the sea ports in recent years was effected mainly by widespread introduction of mechanization. However, even the wide-scale equipment of ports with machinery did not insure the necessary effect. More perfect technical means of transportation were called for. One of these means was the sea ferries intended for carrying railway rolling stock. The using of sea ferries completely excludes the necessity of performing reloading work when transferring freight from the railway to the sea and vice versa.

The construction of a railway ferry between the ports of Baku and Krasnovodsk on the Caspian Sea has already begun and will be completed in 1961-1962. The project includes the building of ferry-boats and shore structures—piers and approach lines. The design of the piers provides for the simultaneous servicing of two ferries.

The crossing will be provided with four to five closed-in diesel-electric sea ferries.

What economic calculations were carried out to determine the effectiveness of the railway-ferry crossing?

Comparison was made of the aggregate expenses for the shipment of various cargoes from the Central Asian republics to the towns and cities of the Transcaucasus by rail, along combined railway and water routes with the usage of a ferry, and along combined railway and water routes with the reloading of the freight from the freight cars to the ships and back.

These calculations showed the obvious effectiveness of freight shipments without reloading and with the use of a railway ferry on the Krasnovodsk-Baku direction.

It was even found to be expedient to include in the zone of effective shipments along this line such major industrial centers, comparatively distant from the sea, as Ashkhabad, Tashkent, Alma-Ata and Stalinabad, on the one hand, and the cities in the Crimea and the Caucasus (taking into account the using of the Kerch railway ferry), on the other hand.

When calculating the effectiveness, the

Ferry-boat soviétique pour la Mer Caspienne

Pour faciliter le transport entre l'Asie Centrale et le Caucase, l'URSS mettra prochainement en service un nouveau ferry-boat pour traverser la Mer Caspienne. Le projet prévoit cinq ou six ferry-boats de haute mer, de conceptions modernes.

Sowjet Eisenbahnfähre für Kaspisches Meer

Für die Verkehrserleichterung zwischen Zentralasien und dem Kaukasus, wird die Sowjet Union demnächst eine neue Zugfähren-Linie über das Kaspische Meer einsetzen. Das Projekt umfasst fünf oder sechs seetüchtige Fähren neuer Bauart.

Ferrobarcos por el Mar Caspio

Para facilitar el transporte entre el Asia Central y el Cáucaso la URSS inaugurará en breve un nuevo servicio de ferrobarcos por el Mar Caspio. El proyecto incluye la construcción de cinco o seis ferrobarcos de diseño moderno.

Ferry Will Cut Railway Costs

following stations were taken as the starting points of the freight: Arys on the Kazakh Railway and Kagan on the Tashkent Railway. And the Baku Railway junction was taken as the destination of the freight cars.

The comparative data effectiveness between Kagan and Baku was expressed in the following figures: the distance along the railway comprises 4513 kilometers; the distance via Krasnovodsk (by railway ferry) is 1528 kilometers, and the time entailed is 20.5 and 4 days respectively; the average cost of shipping one ton of freight is 85 and 36.5 rubles respectively. The total annual economy from shipping freight cars and passengers by railway ferry will exceed 265 million rubles (old currency).

What are the main characteristics of the railway ferry on the Caspian Sea?

The general view of the ferry is given in Fig. 1. It is a single-deck three-screw diesel-electric vessel, 133.8 meters long and 18.3 meters wide, with a displacement of 2240 tons. Equipped with four direct current diesel generators with a capacity of 1250 kw each the ferry will be able to travel at a speed of 16 knots (29.6 kilometers per hour).

If the power of the main diesels is increased from 1800 hp to 2500 hp, the ferry will be able to show a speed of up to 17 knots. To do this without replacing the driving shaft and screw installation, the ferry is provided with two single-armature electric motors with 1460 kw capacity each (550 v, 210 rpm) situated along the starboard and port sides and one double-armature electric motor with 2920 kw capacity (268 rpm) situated amidships. The electric motors drive shafts carrying four-blade brass screws. The diameter of the starboard and port side screws is 2.56 meters, and the diameters of the central screw 2.7 meters.

The crew of the ferry consists of 59 people, including a 38-man deck crew and a 21-man engine-room crew. The railway-car deck is situated below the passenger cabins. This deck can accommodate 30 four-axle 50-ton freight cars or 16 all-metal passenger coaches.

The railway cars are shunted onto the starboard, port or midship tracks of the ferry's deck simultaneously by two locomotives across a special shore-bridge There are four tracks on the ferry: one each on the starboard and port sides and two amidships. The starboard and port tracks can accommodate seven freight cars each, and the midship tracks eight freight cars each (see Fig. 2). The cars are rolled from the deck simultaneously along two tracks. The 290 passengers which the ferry can accommodate are provided with four double-berth cabins and 22 four-berth cabins (first class), as well as 194 tourist-class accommodations (including a mother-and-child room) equipped with soft airplane-type armchairs. The ferry has a restaurant with a seating capacity for 54 persons and a saloon for 28 people.

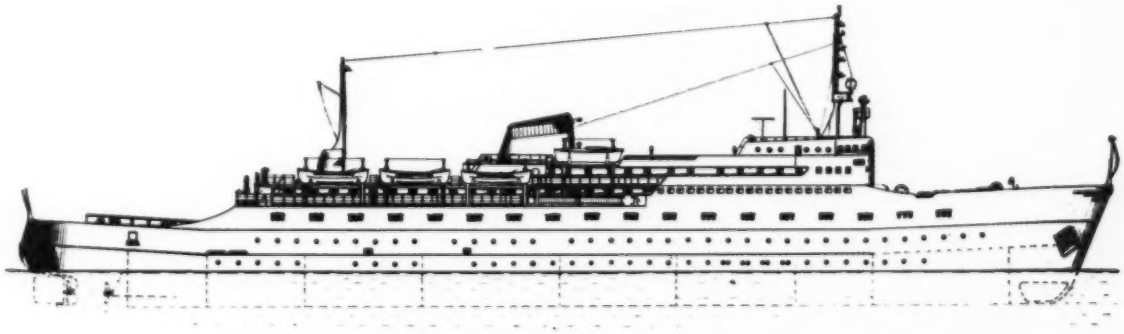
How are the tracks situated on the deck and how are the cars made fast?

The section of the rails differs from the usual type. It is rectangular and the rails are welded to a special depression in the deck. The railway tracks terminate on the shore-bridge in a special switch with 1:9 cross-type transfers suitable for the shunting of coupled freight cars and passenger coaches.

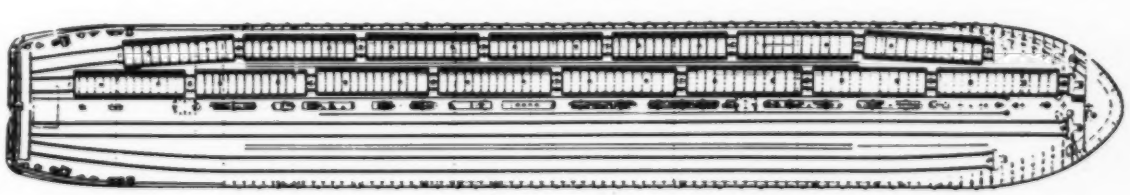
The freight cars are made fast by means of chained girders and the passenger coaches by belts passed through the platforms. An automatic coupling unit in the ferry's bow and stops fastened by special clamps to the rails in the stern prevent the cars from fore-and-aft rolling. In addition, the ferry's compressor line can be switched into the cars' braking system to insure a more reliable fastening of the cars as a further precaution against their fore-and-aft rolling.

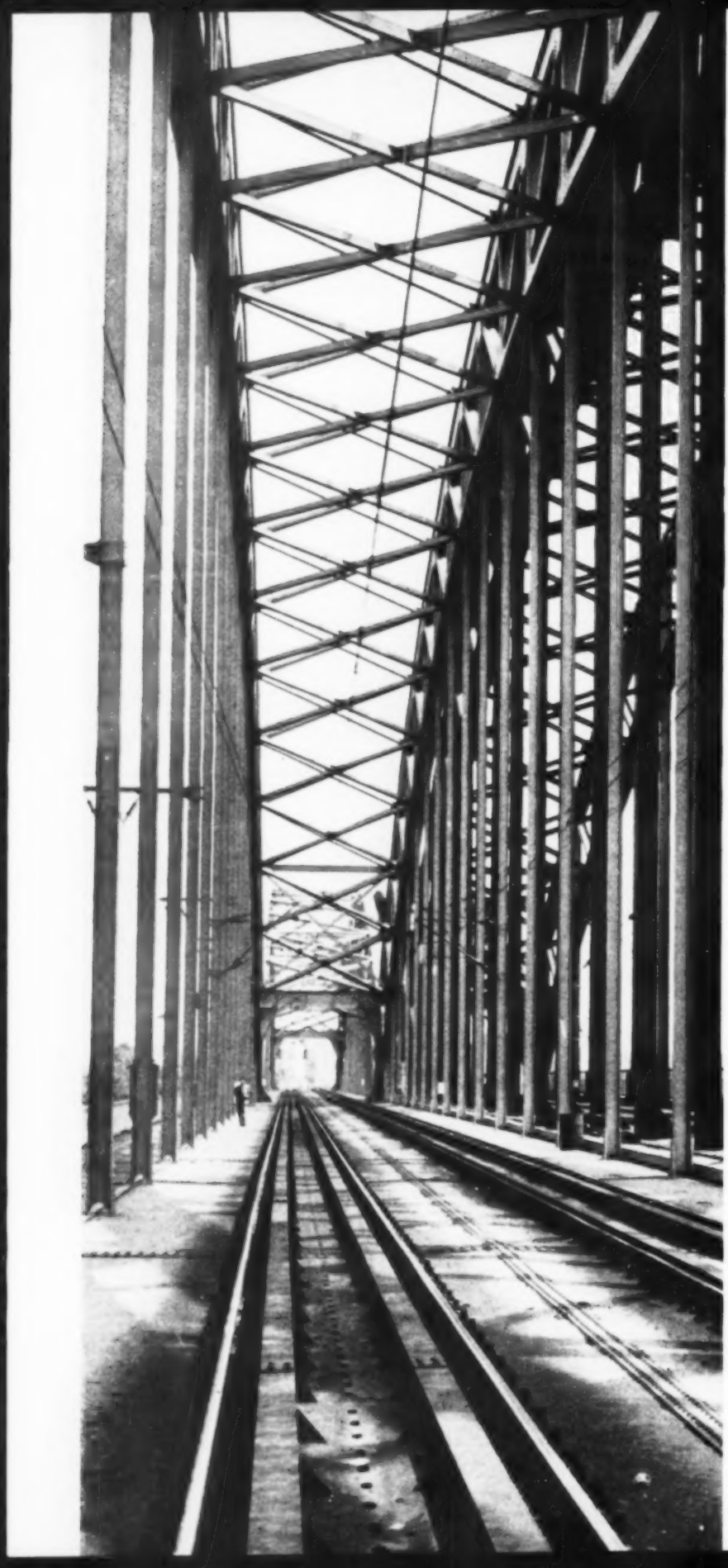
The ferry is equipped with remote control units operated from the wheelhouse, a shaft-and-screw unit, a rudder mechanism, modern radio and electronic navigation instruments (a radio-direction finder, radar installation, gyrocompass, hydro-dynamic log, echo sounder, etc.). The ferry also has an alternating current electric station, various modern means of signaling and fire-extinguishing apparatus. The ferry is provided with all necessary rescue equipment (four lifeboats with hand-driven screws and a seating capacity for 58 persons each, two motor launches with a capacity of 25, etc.).

1.



2.





RAILWAY OF THE MONTH:

When the passengers climbed down from the five little yellow-painted coaches, headed by the polished black and green Stephenson 2-2-2 "Der Adler," and boarded the streamlined diesel trainset at Fürth on the 7th of December, they were stepping through 125 years of history from the beginning of Germany's railway age to the German Federal Railways of today. "Der Adler," with its top-hatted driver, had multiplied itself into over 10,000 steam, diesel and electric locomotives; two kegs of beer—Germany's first rail freight—had become 60,000 million ton-kilometers. History had been reenacted, homage paid to the past, and it was time to begin the 126th year.

What is ahead for the DB in its 126th year—and in the years to follow? What challenges? What opportunities? The challenges are those of most of the world's railway systems: rising costs, competition from road and water and the air, changing economic patterns, and the need for heavy investment in modernization. The opportunities? The chance to become a self-supporting, deficit-free operation; the chance to play a continuing vital role in a booming industrial economy.

Keys to the DB's future are contained in two words: "modernization" and "rationalization."

Modernization of the DB's physical plant has been a necessity, not only as a result of the havoc wrought by World War II—nearly half of all motive power, rolling stock, bridges, buildings and machinery destroyed—but to meet competition and the postwar growth of German industry. Rationalization—elimination of unprofitable services and facilities and the streamlining of administration—will assure maximum benefit from the heavy investment in modernization.

Electrification

A pioneer in electric railway traction, Germany today is steadily extending its electrified network at an accelerated pace. By 1960 the DB's 1600 km of existing prewar electrification had been extended to 3650 km; as German railways enter their 126th year another 1200 km are in progress, 1100 more programmed. Long-range plans envision a further 2000 km, bringing the total to 8000—25% of the total system—in a few years, with 70% of the total traffic moving by electric power. Electrification, judged by

German Federal's 126th Year

DB experience to date, will show a 300 per cent increase in energy efficiency, a 50 per cent cut in maintenance costs, and a considerable reduction in personnel expenses when compared with steam traction.

Dieselization

For lines where traffic density does not warrant the high capital cost of electrification, and for shunting, the DB looks to diesel power, in the form of both locomotives and diesel-powered railcars, railbusses and trainsets. As in the case of electric traction, self-propelled units are finding increasing favor in dieselized services, especially in the form of high-speed trainsets for express services and in the increasing use of light-weight railbusses for secondary lines.

Presently one-third of all shunting operations have been dieselized, and major efforts will be concentrated during 1961 on the purchase of diesel locomotives for secondary lines and mixed-traffic duties.

Diesels and electrification together are expected to reduce the steam locomotive roster from the present 7800 units to 3600 by 1965, with a resulting drop in annual fuel costs from DM 500 million to approximately DM 200 million.

Locomotive Development

A major feature of the DB's motive power program has been the development of standardized series of both diesel and electric units, engineered to fit specific classes of service, with a minimum number of types and maximum possible interchangeability of components to reduce maintenance time and cost. Electric locomotives in the postwar program have been reduced to four main classes, two of which are substantially identical except for gearing and electrical equipment required by different classes of service. With shunting and secondary lines to be dieselized, all four classes are intended for relatively heavy and high-speed road service.

Diesel development has been concentrated in the area of hydraulic transmission, a field in which Germany was a pioneer and in which it stands in the forefront of both design and experience (IRJ, October 1960, p. 68: "The Diesel Debate"). In addition to two classes of low-horsepower shunting tractors, the diesel program encompasses four types now in service, ranging from a 650-hp shunter to a 2400-hp mainline passenger and freight unit; a fifth type, for heavy mainline mixed service, is also included in the program and is in the process of development.

Railcars and Trainsets

From the outset of electrification in Germany the electric railcar and trainset have played an important role in passenger service, and at the outset of 1960 the number stood at 341.

Most recent development in this field is a three-car trainset for short-distance service in the Ruhr area. The ET 30 series sets have a high acceleration rate and a top speed of 120 km/h. Motor bogies at each end of the set develop a total of 2150 hp. Each set has seats for 222 passengers (30 first class) and standing room for an additional 205.

For suburban service on third-rail lines in the Hamburg area the ET 170 trainset has been developed, consisting of two four-motor driving cars with second-class accommodations and a motorless center first-class car. With multiple doors for rapid loading and unloading, the sets will accommodate 200 seated passengers; from 360 to 541 standees.

Among other developments in the field of electric trainset design will in all probability be multi-current TEE sets following the lines of the four sets now being built in Switzerland (p. 22).

CONTINUED

Chemins de Fer Fédéraux Allemands: 126me Année

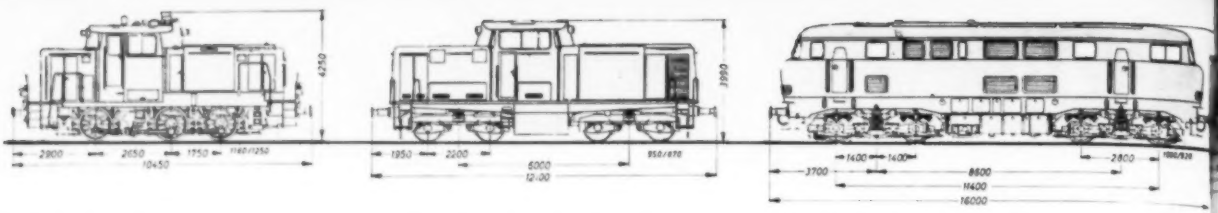
Le 7 décembre 1960, la Deutsche Bundesbahn-système ferroviaire de l'Allemagne Occidentale—célèbrera sa 125me anniversaire par la représentation réalistique de ses débuts, le voyage de six km de Neurembourg à Fürth derrière la locomotive (de construction) britannique "Der Adler". Hommage étant rendu à l'histoire, que réserve l'avenir? La modernisation de son état physique; efficience améliorée de fonctionnement; une concurrence grandissante d'autres systèmes de transport; et le désir continu de fonctionnement en tant qu'unité commerciale se supportant complètement elle-même; tous ces facteurs jouent des rôles importants au moment où la DB entre dans sa 126me année.

Deutsche Bundesbahn: 126 Jahre

Am 7. Dezember 1960 feierte die Deutsche Bundesbahn ihr 125. Jubiläum mit einer Neuinszenierung ihrer Anfänge, der sechs-Kilometer-Reise von Nürnberg nach Fürth hinter der in England gebauten Lokomotive "Der Adler". Nachdem die Vergangenheit gebührend geehrt wurde, richtet sich der Blick wieder in die Zukunft, was wird sie bringen? — Erneuerung ihrer technischen Struktur; verbesserter Nutzeffekt des Fahrbetriebes; zunehmender Wettbewerb mit anderen Verkehrsmitteln; und der ständige Wunsch, als kommerzielle, sich selbst tragende Gesamtheit zu wirken: alle diese Faktoren spielen eine wichtige Rolle im 126. Lebensjahr der DB.

Ferrocarriles Federales de Alemania: el año 126

Al 7 diciembre 1960 la Deutsche Bundesbahn—el sistema ferroviario federal de Alemania occidental—celebró el aniversario 125 con un reestreno del viaje de 6 km de Nürnberg a Fürth detrás de la locomotora británica "Der Adler". Una vez rendido homenaje al pasado: ¿Qué es el programa del futuro? Modernización de las instalaciones; eficacia aumentada de operaciones; competición creciente de otros modos de transporte; el deseo de funcionar como una entidad comercial; todos estos factores juegan papeles importantísimos al entrar la DB en el año 126 de su existencia.



V 60: single-engine shunter; 650 hp, 60 km/h maximum, axle loading 16 tons, 18 tons with ballast.

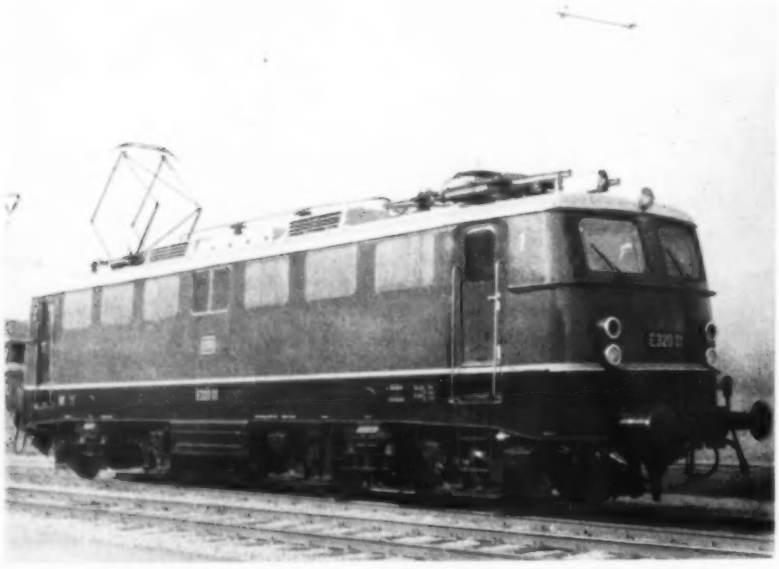
V 100: single engine, mixed branchline service; 1100 hp, 99 km/h maximum, axle load 16 tons, train heating.

V 160: single engine unit for light mainline freight and passenger service; 1900 hp, 120 km/h, axle load 18 or 18.5 tons.

DB type-program for diesel-hydraulic locomotives.

Programme type DB pour locomotives diesel-hydrauliques.

DB's electric-locomotive program includes four standard types for various services.
Le programme locomotives électriques de la DB comprend 4 types pour services différents.
Das E-Lok-Programm der DB umfasst vier Standardtypen für verschiedene Dienste.
El programa de locomotoras eléctricas de la DB incluye 4 tipos para varios servicios.



E 320 bi-frequency locomotives for Saar area operate on German and French AC systems.
Les locomotives E 320 à double fréquense, systèmes CA allemand et français pour la Sarre.
E 320, Zweifrequenz-Loks im Saargebiet für deutsche und französische Wechselstromsystems.
Locomotoras para dos freuencias E-320 para el Sarre en las sistemas CA alemán y francés.

GERMAN FEDERAL CONTINUED

Electrics, Diesels

For traffic on lines without overhead, battery railcars have been in use for some time, the ETA 150 series presently numbering 100 units.

Diesel railcars and trainsets have likewise shown considerable increase, the total standing at 174 heavy railcars and trainsets and 762 lightweight two-axle railbusses for secondary-line service at the start of 1960. The standardization program includes four main classes: a railbus with either a single engine or two engines for hauling trailers; multiple-unit railcars with 700 or 900 total hp for general service; three- and four-unit sets for express service, and 7-unit air-conditioned TEE sets. The railbusses are found throughout the system, operating in trains of up to six units.

Passenger Rolling Stock

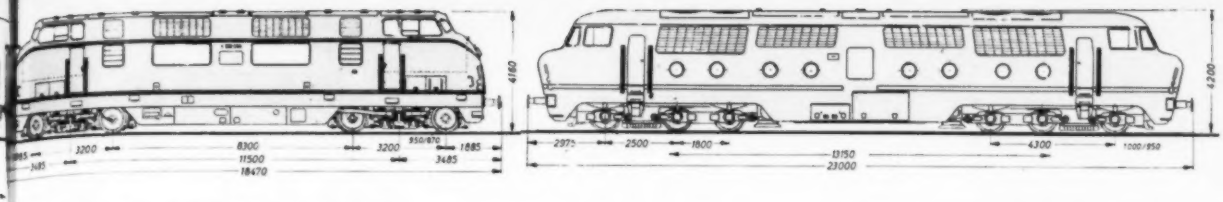
Replacement of obsolete passenger stock and equipment destroyed during the war years resumed in 1950, and today the renewal program is well under way; 2800 units of the present standard steel type are in service, together with 16,000 older steel cars and 5000 cars with wooden body construction, now used in suburban and short-haul traffic.

To replace wooden-bodied equipment in suburban service specially-designed equipment is to be added, and 12 different prototypes are being built and tested. First of these to enter service measures 26 meters and has a stainless-steel exterior. Broad doors make for rapid loading and unloading, while a low 27.5-ton weight and 100-seat capacity produce a high load/weight ratio.

In addition to the purchase of new cars, modernization of passenger rolling stock is being carried out by joining two older two-axle steel cars to produce one bogie car.

Freight Rolling Stock

The development of special purpose freight cars has been given high priority



V 200: twin-engine mainline unit for medium freight and passenger service; 2200 hp, 140 km/h, axle load 21 tons.

V 320: twin-engine unit for heavy freight and passenger service, now under development; 3800 hp, 160 km/h, axle load 19 tons.

DB Typenprogramm für diesel-hydraulische Lokomotiven.

Programa de la DB para locomotoras diesel-hidráulicas.

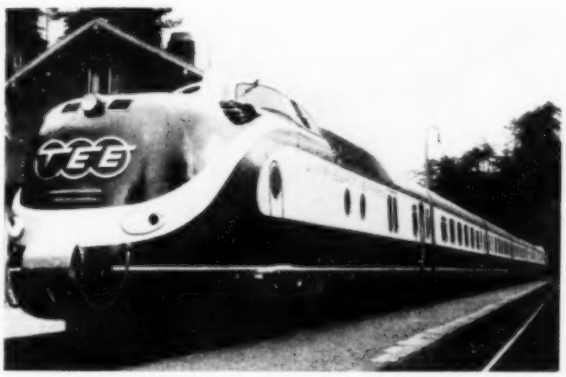
Lead in Modernization of DB's Motive Power Roster

in the DB's modernization program, with such cars now making up 10 per cent of the total fleet compared with 2.5 per cent in 1950.

Primary attention has been given to cars adapted for the automatic or mechanized handling of cargo; competition with road and water carriers has demanded improved transfer between different modes of transport, and the need has been accelerated by a shortage of manpower and steadily-increasing wage scales.

Of the special open cars, the most popular is the two-axle Otmm side-discharging hopper car for bulk goods, with a capacity of 28 tons, 33.5m³. For easy transfer of bulk cargo to railside motor trucks, the Ommi tip car is used, with five hand-tipped sections mounted

CONTINUED



Seven-car TEE diesel sets are pride of DB trainset fleet.
Rames TEE diesel de sept voitures, l'orgueil de la DB.
Siebenteilige TEE-Dieselzüge, der Stolz des DB Wagenzugparks.
Ramas TEE diesel, consisten de siete coches orgullo de la DB.

Nearly 800 light railbusses serve DB secondary lines.
Environ 800 autorails pour voies secondaires de la DB.
Ungefähr 800 Schienenbusse sind auf Nebenlinien der DB eingesetzt.
Casi 800 ferrobuses sirven en las lineas secundarias de la DB.

Three-car electric trainsets serve Ruhr area.
Rames électriques de trois voitures pour la Ruhr.
Elektrische Dreiwagenzüge befahren das Ruhrgebiet.
Ramas eléctricas de tres coches sirven la zona del Ruhr.

Stainless-steel car is prototype for suburban service.
Voiture acier inoxydable, prototype pour le service de banlieu.
Rostfrei-Stahlwagen, Prototype für den Vorortverkehr.
Vagón de acero inoxidable: prototipo para servicios de cercanías.

Special-Purpose Cars, Containers Help Meet Increasing

Silo cars for dry cargo; double-deck open cars for automobile traffic.
Wagons silo pour fret sec; wagons couverts à deux étages pour automobiles.
Speicherwagen für Trockenladung; offene Doppeldeckwagen für Autobeförderung.
Vagones de cisterna para cargos secos; carros de dos pisos para el transporte de automóviles.

high enough to dump directly into road vehicles. Limited capacity of 22.5m³ for the car led to the development of the Ommu 61 car, in which the normal car body is lifted and tipped by an electro-hydraulic mechanism. For dumping into under-track bins, a center discharging car, the Ommu, uses an electro-hydraulic mechanism to lift both ends of the car body for discharge through an opening in the center of the car frame.

For mechanized handling of cargo in covered cars a car with sliding walls and roof (Kmmghs) permits the opening of half the car side and roof at a time, giving easy access for cranes and lift trucks handling palletized cargo. The car has a capacity of 27 tons and 60m³, but cars with increased capacity are being ordered. Completing the picture is a system of national and international exchange of standard pallets; standard 80 × 120 cm

German Federal's Vital Statistics

(ALL FIGURES ARE FOR 1959)

Main Lines	18,626 km
Secondary Lines	12,092 km
Narrow Gauge Lines	186 km
Total	30,904 km
Electrified trackage	3471 km
Steam locomotives	7810
Electric locomotives	938
Diesel locomotives	724
Small diesels and tractors	970
Electric railcars and sets	341
Diesel railcars and sets	174
Light diesel railbusses	762
Passenger cars	21,979
Freight cars	273,000
Total personnel	487,636

CARS ORDERED FOR 1961 DELIVERY:

Closed cars, 25.5 tons, 30.5 m³	550
Closed cars for ferryboat traffic to England, 21 tons	150
Open hopper cars, 28 tons, two axles	1600
Closed hopper cars, 27.5 tons	500
Open hopper cars, 57 tons, four axles	550
Closed hopper cars, 55.5 tons, four axles	40
Closed cars, sliding walls and roof, 25.5 tons, 33 m³	200
Closed cars with sliding walls and roof, 27 tons	400
Closed cars with sliding roof, 28.5 tons	800
Flat cars with stanchions, 27.5 tons, 12.5 meters	2500
Flat cars, 56 tons and four axles, 18.5 meters	500
Double-deck auto transport cars, three-axle articulated	300
Five-container flatcars, 31.5 tons	650
Five-ton open containers	3000
Small closed containers, one to three m³	6000

pallets are brought into the pool by shippers, with the DB furnishing an empty pallet in return for each loaded pallet received.

For shipment of dry granular bulk cargo such as cement, silo cars with air-activated discharge systems are widely used. The Kds two-axle car now in use has two silos with a total capacity of 27 m³ and 28 tons; a four-silo bogie car has recently been developed.

In wide use for the transport of finished automobiles, a two-deck articulated car with three axles (Offs) can accommodate 10 Volkswagen-sized cars; latest units have smaller-than-standard wheels to keep cargoes of larger automobiles within the permissible loading gauge.

Another special flat car is in use for "Huckepack" (piggyback) service with a deck only 65 cm above the railhead. With the special cars two different road trailers are in use. Type 1, a 16-ton trailer with a 41 m³ capacity is carried on its own road wheels; Type 2 is in effect a 17-ton container which rides on a removable highway chassis between warehouse and railhead.

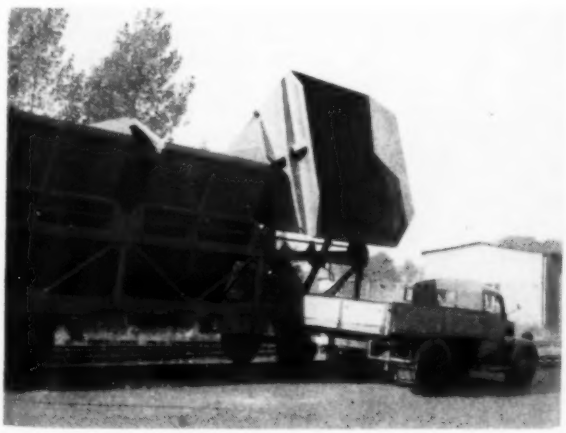
For much the same purpose, rubber-tired transporters have come into increasing use, permitting loaded freight cars to be picked up and delivered at warehouses without direct rail connection. The newest of these "Strassenroller" units has 16 pneumatic tires on eight axles with coupled steering on curves. The transporter can handle two-axle cars with a gross weight of up to 40 tons, and can also be used to handle heavy loads such as transformers, turbines, and other machinery.

Containers play an increasing role; this model is designed for overseas traffic.
L'utilisation des containers s'amplifie: modèle spécial pour service d'outremer.
Behälter spielen eine zunehmende Rolle; dieses Modell ist für Überseetransport.
Containeres juegan un papel más importante; diseño para transporte marítimo.

For its steadily-increasing "Haus zu Haus" container service (see "World Poll," p. 14) DB presently uses flat cars with a capacity of three or four five-ton containers for the most part, but five-container cars are coming into service, and research on a special lightweight container car is progressing.

The DB's increasing reliance on diesel and electric traction, and the introduction of new types of cars, has been accompanied by changes in equipment maintenance practices. Concentration of such work in a smaller number of shops has permitted a 10-year reduction of 40 per cent in equipment maintenance forces, but enough regional facilities have been retained to avoid excessive unproductive

CONTINUED



Three-section tip car transfers load easily to highway truck.
Wagonnet à bascule en trois sections facilite le déchargement.
Leichte Umladung der Güter von dreiteiligen Kippwagen.
Vagón basculante de tres secciones para transbordo fácil.

High-capacity cars are used for bulk-cargo service.
Wagons à grande capacité utilisés pour fret en vrac.
Hochleistungswagen werden für Schüttgut verwendet.
Vagones de gran capacidad para cargos a granel.

mileage of locomotives en route to overhaul.

As its program of motive power and rolling stock development clearly indicates, the DB puts heavy emphasis on research. Research institutes for locomotives, cars, brakes, mechanical materials, chemicals and welding techniques are maintained at Minden and Hannover. Similar facilities for electric and diesel motors, signaling and permanent way are located at Munich. German rolling stock manufacturers, too, are engaged in intensive research, in recognition of today's competitive conditions in transport, and from a desire to increase their export sales.

Permanent Way and Signaling

For maintenance of track the DB has recently introduced an integrated mechanical track-renewal program; while more expensive than manual methods, the new system, in which one crew can handle seven kilometers of track in 15 working days, is a solution to a persistent shortage of manpower and the great backlog of track renewal remaining from the war years.

Together with track renewal, a major task immediately following the war was the rebuilding of bombed-out bridges; now attention is turning to the doubling of bridges to accommodate increased traffic. The addition of spans for two additional tracks on the Hohenzollern bridge at Cologne, for instance, was a major recent project.

In signaling, considerable attention is being devoted to the centralizing of interlocking and route control, especially in major terminal cities. The Frankfurt/Main signalbox controls seven stations, the tracks connecting them, and entrance and exit to lines entering the city—altogether the single location controls 500 turnouts and 550 signals.

Automatic train control is being extended; and to date 52 per cent of mainline trackage is so equipped, and more than 1600 locomotives carry the "Indusi" equipment.

Modern interlocking serves entire Frankfurt area.
Enclenchement moderne pour le reseau entier de Francfort.
Modernes Stellwerk bedient das ganze Frankfurter Gebiet.
Puesto de enclavamiento moderno sirve la zona entera de Francfort.

DB's 126th Year:

A major goal of the German Federal is to operate on a commercial and self-supporting basis. In a speech before a trade and industry forum at Frankfurt am Main the DB's president, Prof. Dr. Heinz Maria Oeftering, touched on some of the problems involved and the DB's own suggested solutions.

Progress to date: "DB's development in the last four years can be characterized by these figures: in 1957 the DB showed a deficit of DM 678 million; in 1958 this figure —in spite of the coal and steel crisis—went down to 576 million. In 1959 the deficit was reduced to 356 million, and in 1960 it will—so far as I can see now—probably amount to 195 million, in spite of a work week three hours shorter and two wage increases. This is mainly due to our own rationalization and the general boom, and in any case will be achieved without additional help of any kind from the Federal household.

"The secret of this pleasing turn of affairs is that we have been able to decrease our personnel by 43,000 without having had to fire a man. In 1960 we have had better traffic results than in 1957—our best year so far—but with 43,000 fewer people. We plan to continue this systematic replacement of human beings—the most expensive working power—by machines and we intend to cut down our staff in 1961 by another 3000.

"All this can only be achieved by very high investments which we have been able to maintain these last few years at DM 2200 to 2300 million per year. These figures are gross investments which in fact are a bit higher still, for they do not take into account our own achievements such as—for example—the modernization of equipment."

Traffic and the competition: "So far all this sounds good and cheerful. We cannot, however, close our eyes to the fact that although the DB can be credited with over 50 per cent of the total traffic handled, our share shows a slightly declining curve while the share of our competitors

increases—though the rate of increase is slowing down. It goes without saying that the DB aims to bring its own curve into a horizontal position."

The Brand Report: (This report, issued in the spring of 1960, was prepared by a government commission established as a result of a memorandum from the DB president and directors.)

"The DB is very happy with the contents of this report. These men have put a stop to a number of suggestions that the DB was an out-of-date, technically obsolete apparatus, run by calcified bureaucrats, longing for state protection and doing nothing with respect to competition.

"Its conclusion is that the DB can work economically and even make certain profits if only certain legal shackles can be removed. The balance of the Brand Report is a simple confirmation of the proposals made by the president and the board of directors of the DB. It is significant that certain of the report's proposals have since been put into effect, though some political objections—for instance, with regard to the closing of completely unprofitable lines—have had to be overcome."

Greater freedom of tariffs: "No enterprise in the world can serve its proper function unless its accounts are in order; the general usefulness of the DB ends where the red ink starts.

"In this connection the proposals concerning tariffs were pretty disappointing, but they have been withdrawn and new ones will be made up.

"Thus far, for even the slightest change in tariffs, we have had to apply to the Ministry of Transport. There, extensive deliberations started in which not only the interests of the shippers but most of all the interests of our competitors played an important role.

"Often, these deliberations led up to a simple refusal because, under the established rules, a tariff proposal is considered to have been approved after three months if during that time it has not been turned down.

"Thus, we would receive, before the three-month period expired, a letter from our supervising ministry saying more or less this: 'Your request of such and such a date is hereby refused. We suggest you repeat the request in order to obtain a further three-month consideration'."

Responsibility for tariffs: "Instead of the long deliberations mentioned, we should like to be able to establish a certain number of exceptional rates so that they could at least be put into effect. Should they subsequently not get the approval of the ministry or the government, the ministry or the government would of course have the right to abolish them, since in this area we are not autonomous but the Federal government is, and should be. This change in procedure would of course result in the ministry and government being extremely strict, and it would also make perfectly clear who is responsible when, for instance, the DB proposes a reduction in rates which is then abolished by higher authority in the interests of our competitors."

The passenger deficit: "The Brand Report has put its finger on one of the sore spots of the DB, the fact that ordinary passenger traffic shows a high deficit, reaching the frightful sum of DM 841 million.

"On the other hand, our express trains show a profit of 231 million, so the loss is still more than 600 million annually.

"Our trying to heal this wound has led the DB into other fields, notably in freight traffic, having comparatively excessive tariffs. And these excessive tariffs necessarily lead to a weakening of our competitive position. Consequently we have decided to fight this loss of 600 million.

"Nobody can close his eyes to the fact that the biggest share of this loss is due to the so-called occupational and scholars' traffic. In the case of the so-called 'sister-cards' for scholars, only five per cent of the DB's own costs are covered. And our social fares that we now charge cover less than half of our own costs. Consequently we have asked the Federal government for an increase of the social tariffs amounting to about DM 300 million."

Cost of social benefits: "The Brand Commission has studied the enormous maintenance provisions of the DB . . ., These maintenance provisions amount to something more than DM 1100 million—provisions higher than any private employer or private corporation has to pay, both in terms of social securities as well as voluntary pension and supplementary provisions.

Prof. Dr. Heinz Maria Oeftering

"Now the Brand Commission has proposed that the DB should be considered as if it were a private employer—that is, to have the normal pension expenses, but to have any additional provisions taken over by the Federal exchequer. The Federal government has followed this and other Brand proposals only hesitatingly."

The outlook for 1961: "In spite of all the scepticism, and in spite of the slight American recession, it is expected that the present boom will continue in 1961. As a result, we expect revenues of nearly 8000 million. In addition there will be the allowance of 175 million for maintenance provisions, 150 million in tariff increases not yet allowed but necessary in fact, and 45 million in interest. Also there will be for the full year 1961 the increase established on 1 November for express goods, certain shipping, and so forth—altogether probably about 200 million. And we count on our rationalization continuing in 1961.

"All in all, and in spite of another 400 million that must be taken into account in view of definite future wage increases, it has been possible to compose an operating budget for 1961 that for the first time since long ago is healthy and balanced."

Special Section on Permanent Way

Aerial Surveys Can Speed Railway Design and Location

The author, Dr. J. M. Zarzycki, chief engineer, Engineering Services Div., Canadian Aero Service Ltd., has executed photogrammetric surveys for major international projects. He has degrees from Warsaw Technical University and Swiss Federal Institute of Technology, and has been a post-doctorate fellow with the National Research Council of Canada. Recently, he participated in the 9th International Photogrammetry Congress in London and lectured at the International Training Centre for Photogrammetry at Delft, The Netherlands.

The development of natural resources in many countries of the world is creating a need for new railways in rugged, unexplored areas. Often a railway must be located, designed and built within a short period of time. It may also be necessary to keep the project confidential until the line location is final and the right-of-way acquired.

In the past, many hours of fieldwork were necessary to collect the basic terrain information. Only limited data could be obtained. Alternative routes could seldom be sampled fully.

Today, photogrammetry can provide the railway engineer with essential terrain information for a broad area quickly and reliably. It has proved itself in major projects in Africa, Canada and the United States.

Photogrammetry, a branch of civil engineering, is the science of obtaining survey information from aerial photographs with the aid of limited ground control data. In railway surveys, it employs precision aerial cameras, first-order plotting instruments and electronic computers, combined with advanced compilation and interpretation procedures.

Railway location and design studies by photogrammetric methods are carried out in four major steps:

1. Preliminary reconnaissance to determine all possible route locations.
2. Further surveys of most feasible route and its alternatives to produce a "paper location" of a semi-final route on topographic maps.
3. Detailed survey of the selected route for preparation of accurate cross sections and large scale topographic maps of selected areas.
4. Detailed surveys during and after construction to determine earthwork quantities moved.

How have these methods performed in the tropical rain forests of Liberia and in Canada's rugged far north? In Liberia, the problem was the location of an 80.5-km railway from Bomi Hills to the Mano river. Though the difference in elevation between the terminal points is only about 60 meters, the location posed several interesting problems:

a. Many streams and rivers flow at right angles to the proposed route.
b. The generally flat terrain is marked by many local hills with high elevations.
c. Tropical rain forest covers the ground.
d. No topographic maps exist.

The only information available was aerial photomaps with a scale of 1:40,000, prepared in 1953 by Aero Service Corporation, Philadelphia. As a first step, 15.24-m contour lines were compiled from these photos and superimposed on a controlled photo-mosaic, scale 1:40,000, for the entire 80.5 by 48.3-km area.

Vertical information consisted of an elevation at Bomi Hills and the elevation of the air strip at the Mano river terminus. These had been established barometrically. There were no permanent monuments of known elevation. Therefore, the elevations of vertical control points required for the compilation of the contours were established photogrammetrically.

From stereoscopic study of the aerial photos, controlling topographic features were determined: possible river crossings, major geological and soil boundaries, location of swamps, and potential problem areas. Based on the air photo analysis and the topographic map data, a tentative preliminary route was selected.

This route was checked during a field reconnaissance of the area. At the same time, the air photo analysis was verified. Particular attention was given to the soil and geological conditions, problem areas, the depth to bedrock and selection of possible bridge sites. Elevations of major controlling features were checked with an altimeter.

Results of this preliminary reconnaissance survey were presented in the form of a written report, keyed to the 1:40,000 photo-mosaic with 15.24-m contour lines —the proposed route and alternatives were shown on the photo-mosaic, and a comparative estimate of construction costs made. Areas to be photographed for compilation of 1.524-m contour maps, at a scale of 1 mm: 2.4 m were also delineated.

After the preliminary reconnaissance data had been studied, a route strip was selected. Additional data was needed for

the route strip so that a detailed projection of the center line could be made, earthwork quantities estimated and drainage determined.

First step in this survey of the selected general route strip was to obtain large scale aerial photography for this area. The needed 1.524-m contours could not be plotted accurately from the aerial photos because of the heavy vegetation that obscured the land forms. On the other hand, a ground survey to produce accurate contours would have taken many months and would have cost a great deal of money.

New approaches were sought to provide sound results within the available time and budget. In addition to aerial photos on conventional panchromatic film, infra-red photography was used with a precision mapping camera equipped with a special new lens. These infra-red photos showed far more differentiation in the tropical forests than panchromatic photos, improving the stereoscopic image substantially, and they also permitted better perception of the actual terrain beneath the trees in certain areas. Drainage, too, could be traced much more easily on the infra-red photos. Rivers up to 15.24 meters wide could not be seen at all on the panchromatic photos, but were clearly visible on the infra-red negatives, taken from a height of 3000 meters.

From these infra-red photos, topographic maps with a scale of 1 mm: 2.4-m and 1.524-m and 3.048-m contour intervals were prepared. In addition to contours, the maps showed drainage patterns, trails, and native villages. The width of the mapped strip varied from 1.609 km in areas where several alternatives were under study, to .4025 km in areas where route location was less complicated.

Before these large-scale maps could be compiled, it was necessary to establish vertical and horizontal control data on the ground, so the aerial photos could be scaled and levelled in the plotting instruments. It was also necessary to establish permanent bench marks and permanent horizontal control points; later the survey of the center line would be tied in to these.

The control survey consisted of a traverse and a level line. To attain a high degree of accuracy, levels were run independently by two survey parties and were closed at the same bench marks each day.

The horizontal control was in the form of a traverse. Permanent monuments were established at 1.609-km intervals. The survey was run as close as practical to the proposed railway center line; to avoid heavy line-cutting, it followed existing roads and trails.

The new large-scale aerial photos used in the mapping also were employed in a more detailed photo analysis. It provided the following data:

1. Classification of soils and rocks, according to their major engineering characteristics.
2. Location of gravel, sand, crushed rock and borrow for construction purposes.
3. Location of potential trouble areas.
4. Drainage and structures information.

Thus, with the topographic maps and air photo analysis in hand, the design and location engineers could:

1. Locate center lines to avoid problem areas and minimize rock cuts.
2. Determine the grades, lengths and

CONTINUED

Méthodes de Levé Aérien Accélère Emplacements Ferroviaires

Dans la construction et la mise en carte de nouvelles lignes de chemin de fer, souvent dans des régions non-développées et mal mises en carte, l'utilisation de la photographie aérienne, combinée avec les méthodes modernes stéréoscopiques de dresser des cartes et de systémes de calculs, s'avère un remplacement de grande valeur des méthodes conventionnelles d'arpentage. Combinée avec les méthodes d'arpentage, la photogrammétrie peut donner non seulement des emplacements provisoires, mais en outre des évaluations très précises de déplacement de terre; les méthodes photogrammétriques sont également de grande valeur pour la supervision des progrès réalisés au cours des nivellements en cours. L'auteur, Dr. J. M. Zarzycki du Canadian Aero Services Ltd., discute les applications de levé ferroviaires de photogrammétrie, plus particulièrement de la construction de lignes pour le transport des minerais au Libéria et le Canada oriental.

Photogrammetrie beschleunigt Eisenbahn trassierung

Bei der Anlage und Vermessung neuer Eisenbahnen, oft in unerschlossenen und kaum in Karte gebrachten Gebieten, sind Aufnahmen aus der Luft, vereint mit stereoskopischen Topographiemethoden und Rechengerätergebnissen, ein wertvoller Ersatz für konventionelle Bodenvermessungen. Zusammen mit Bodenvermessungsmethoden, können mittels Photogrammetrie nicht nur vorläufige Trassierungen sondern auch Schätzungen für Erdarbeiten von grosser Genauigkeit berechnet werden; photogrammetrische Methoden sind ebenso wertvoll für weitere Vermessungen während der effektiven Planung. Der Verfasser, Dr. J. M. Zarzycki, Canadian Aero Services, Ltd., bespricht Anwendung der Photogrammetrie bei Eisenbahnvermessungen mit besonderem Hinweis auf die Erzförderbahnanlagen in Liberia und Ostkanada.

Agrimensura aérea acelera metrado de obras

Resulta que en la construcción y agrimensura de nuevas líneas férreas, en regiones poco desarrolladas y exploradas, la combinación de la fotografía aérea, métodos estereoscópicos y aritmógrafos electrónicos es una substitición valiosa por los métodos acostumbrados de la agrimensura tradicional. En unión con la agrimensura tradicional la fotogrametría puede facilitar no sólo un metrado previo sino también estimaciones exactas de excavaciones. La técnica de la fotogrametría es igualmente valiosa durante el allanamiento. El autor, Dr. J. M. Zarzycki de la Canadian Aero Services Ltd. discute las aplicaciones de la fotogrametría ferroviaria y en particular su aplicación en la construcción de los ferrocarriles que transportarán minerales en Liberia y el Canadá oriental.

PHOTOGRAMMETRY

CONTINUED

bearings of tangents and co-ordinates of the points of curvature, points of tangent and points of intersection.

3. Determine preliminary excavation quantities and prepare grading diagrams.
4. Draw preliminary designs of culverts, bridges, trestle sites and tunnels.
5. Plan special construction needed in landslide and other problem areas.
6. Estimate stability of fills.
7. Determine accessibility of borrow.
8. Estimate needed clearing of timber and undergrowth along right-of-way.
9. Plan location of bore holes.
10. Prepare contracts for tenders for construction.

Photogrammetry and planning of the alignment were closely integrated. Three-dimensional models of the terrain were studied in the stereoplotters to provide additional information concerning the land forms in specific areas for the location engineers. The accuracy of the profiles obtained from the contour maps was refined by taking direct measurements of specific points with the plotting instruments.

This integration offers major advantages. It gives the location engineer a continuous reference to the terrain during the design of the alignment and accurate measurements can be made without the delays and difficulties of ground studies.

The location crew then staked the center line on the ground, using these maps, with the projected railway alignment. They obtained a profile and made the minor adjustments in the alignment required by the local terrain. Through the integration of photogrammetry, engineering design and ground survey, it was possible to complete the entire project in six months.

These methods, so successful in Africa, have been very useful in railway location projects in Canada also. They have been used in the provinces of British Columbia, Manitoba, Ontario, and Quebec. The 308.9-km railway from Port Cartier to Lac Jeannine, recently constructed for the Quebec Cartier Mining Company, is almost a textbook example of the sound uses of photogrammetry in railway location and construction. The procedures followed in the reconnaissance and more detailed phases of the survey were essentially the same as in Liberia, though the Canadian terrain is more rugged and the tree cover less of a mapping problem.

In Canada, photogrammetry has been employed for the detailed survey of the selected route, and to determine roadbed cross sections before construction. The detailed survey begins when the right-of-way is first cleared and the center line re-staked and accurate cross sections obtained. Then photogrammetric methods combined with electronic computing techniques can determine cross-section profiles and earthwork quantities.

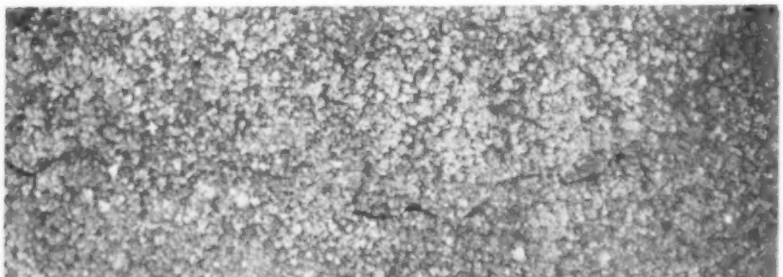
This approach has been followed, for example, on sections of the Cartier railway. At the same time the center line is re-staked for construction, the ground control needed for absolute orientation of the stereo photos is obtained. This additional control is required for the refined, precise plotting involved in determination of cross sections.

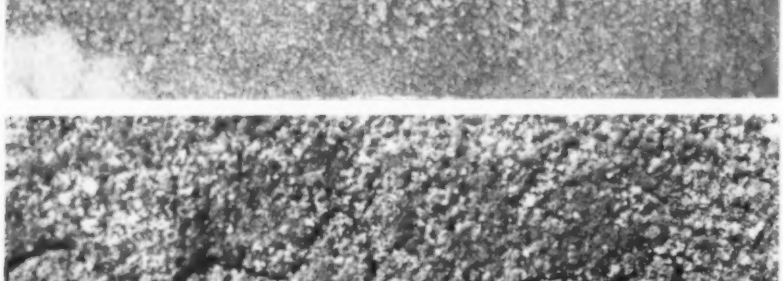
How are these needed additional ground control data quickly obtained? At 30.5-m intervals the center line stakes are flagged with 305-mm cardboard squares. The permanent control points are spaced at 121.9-m intervals, about 45.7 m from the center line on both sides of the center line. These points are flagged with wooden crosses, whose elements are 1.524 m long and 305 mm wide. Thus the ground control network consists of center line stakes marking known positions and elevations, and supplemented by permanently marked points (safely beyond the cleared right-of-way) which identify known elevations.

After these positions have been flagged, aerial photographs are obtained with a precise 152.4-mm Avigon lens. Scales vary from 1:3600 to 1:4000.

The procedure for obtaining cross sections begins with the preparation of manuscript sheets at a scale of 1:600, showing the railway center line as staked on the ground. The cross sections are "read" on the stereoplotter, beginning with the elevation on the center line. The operator notes the station number, then punches automatically on tape the location of each significant change in elevation along the cross section. These elevations are read twice, and an average taken for the computations. The data are presented on a punched tape and in typewritten tabular form.

From these data, a computer calculates vertical curves, design quantities of grading classified according to type of material, and selects an appropriate cross section for the terrain, height of fill or depth of cut, and type of material.





Panchromatic photograph is unclear, land features obscured; same area in infra-red photo shows watercourse, terrain clearly.

Photo panchromatique indistincte, les contours du paysage sont obscurs; la même photo en infra-rouge montre cours d'eau clairement.

Panchromatische Fotos sind unscharf, die Umrisse verschwommen; auf dem Infrarot-Foto ist dasselbe Gelände deutlich mit Wasserlauf zu sehen.

Fotografía pancromática es borrosa y no pone en relieve el carácter del suelo; la misma en infrarojo hace ver curso del agua y terreno.

Wild A-8 Autograph stereoplotter with Ek-3 Coordinate Printer and Profiloscope is used in plotting maps from aerial photographs.

Traceur stéréscopique autographe Wild A-8 avec imprimeur coördiné EK-3 et profiloscope utilisé pour cartographie-photos aériennes.

Autographische Stereokamera, Wild A-8, mit Ek-3 Koordinatenzeichner und Profiloskop für Geländekarten mittels Aufnahmen aus der Luft.

Wild A-8 Autograph stereoplotter con Ek-3 coordinate printer y profiloscope se utiliza para trazar mapas de fotografias aéreas.

In addition, a second computer program produces punched cards for use in the Electro Dataplotter, providing a graphical presentation of the data (see photo page 54). This is important because it enables the design engineer to review the photogrammetric cross sections readily and evaluate the slopes and cross section chosen by the computer in the calculation of the earthwork quantities. Since this program also computes the data required for setting slope stakes and presents it in tabular form, the stake-out for construction is simplified. Borrow pits are photographed and cross sections are determined in the same manner, before any material is moved.

Photogrammetry also aids in determination of the cross sections at different stages of construction, and in the computation of pay quantities. In this work, new aerial photos are taken at various stages of construction. From them, progress cross sections and progress quantities of grading are obtained according to the requirements of the project. In some cases, it is necessary also to obtain aerial photos for cross sections after the overburden is removed and bedrock exposed so that accurate cross sections of the rock surface can be obtained.

The final earthwork quantities are computed photogrammetrically after the grading is completed. New aerial photos of the area are obtained for study in the Wild stereoplotters. The permanent ground control points, established earlier beyond the right-of-way area, provide the essential elevation data. Cross sections of the finished grade are read off in the same manner and for the same locations as the cross sections obtained before construction.

Two basic computer programs are used in these calculations—a progress pay quantities (or borrow pit calculation) program, and a final pay quantities calculation program. For the progress pay quantities and borrow pit program, the calculations are essentially a comparison between two surveys. The cross sections before construction and cross sections at a specific stage of construction progress are compared, and the differences computed. The final pay quantities program takes into account the design criteria, calculating only cut and fill done within the design specifications.

These computing programs are planned to use cross sections obtained by photogrammetry or ground surveys. This is important because it may be impractical at times, due to weather or other reasons, to obtain new aerial photos, and the cross sections must be established by ground survey. These data must be integrated with the photogrammetric cross sections when the computations are made.

As a part of the broad program for quantities computations, it is possible to produce in these same operations punched data cards for the Electronic Associates line plotter. From these punched cards, the following data can be plotted automatically:

1. The cross section of the ground before construction.
2. The cross section of the finished grade.
3. The designed cross sections modified for maximum pay line allowance.

This graphical presentation enables the construction engineer to review the constructed grade and embankments and compare them with the design.

How dependable are profiles obtained photogrammetrically? To check this, elevations of 211 points were surveyed on the ground over an 11.3-km section in northern Quebec. About half of this section is gently rolling terrain and the remainder rough country. The ground surveys revealed that the mean square error of the elevations obtained photogrammetrically is plus or minus 36.6 mm. The maximum error in elevation was 91.4 mm. These accuracies are from a typical project, employing standard photogrammetric procedures.

In summary, the integrated approach—combining photogrammetry, electronic

CONTINUED ON PAGE 54

Diagram of final earthwork requirements as produced by computer.

Diagramme d'égalisation; données par machines électroniques.

Diagramm der erforderlichen Erdarbeiten nach dem Analogrechner.

Diagrama definitivo de las obras de desescombro producido por la unidad IBM.

Zig-Zag Sleepers Give Greater Track Strength

Visitors to the international permanent way exhibition at Elst, The Netherlands (IRJ, February, p. 49) will have the opportunity to study an unusual new system of track construction developed by J. F. Deenik, Netherlands Railways' superintendent of permanent way and works and J. A. Eisses, technical inspector.

The new concrete sleeper design features zig-zag construction which promises to overcome problems of track stability resulting from temperature changes in long welded rail and the reduced resistance to shifting of concrete sleepers compared to wood.

This last problem was an important one for the NS, whose ballast is composed to a great extent of round stone gravel rather than broken gravel or crushed stone. Such ballast not only offers less resistance to shifting by its nature, but tests have shown that when stirred, as is the case with slewing or raising of track, the gravel ballast shows an increased lack of resistance which persists for a considerable time. This problem is considerably aggravated by the relatively unstable subsoil on which much NS trackage is constructed, the subsidence of which requires frequent track adjustments.

By far the greatest amount of track in the NS network is laid on wood sleepers, in spite of the fact that virtually all wood must be imported. When the question of using concrete sleepers arose, the NS experimented with various types. Prestressed concrete sleepers were tried, but were ruled out on the grounds of greater susceptibility to damage in the case of derailments. Next, a sleeper of the well-known and widely-used Sonneville (RS) type was tested, consisting of reinforced concrete blocks connected by a steel bar.

The present system is essentially a modification of the RS design. To overcome the problems of buckling and shifting resulting from the unreliable gravel ballast and rail temperature ranges of from —30° to +55° C a design was evolved which in effect makes the track into a horizontal truss section.

Reinforced concrete blocks, incorporating fastenings for elastic rail clips, are staggered at intervals of 69 cm under each rail, and each block is connected to the two opposite blocks by lengths of steel tubing. To avoid taking track out of service and interrupting the unusually heavy traffic density found on the NS (principal lines have half-hourly passenger-train schedules during the day, and heavy freight traffic is carried at night) the system was required to be of a type that could be installed piece by piece and assembled in a minimum of time and with simple tools. In the initial design adopted, the two round steel tubes were held in a trapezoidal hole in the block with the aid of a cast-iron wedge held in place by a bolt.

Tests were conducted with track of this design at the research laboratory of the British Railways Western Region in London. The laboratory makes tests in an unused section of a London tunnel; here track panels can be fastened rigidly at both ends to prevent longitudinal expansion and heated until they buckle. As a completely straight track does not in theory buckle, an initial deflection is given and temperature carefully recorded.

During the first test with zig-zag track, with the panel laid on top of rather than in the ballast, the section could not be buckled even with rail temperature raised to 90° C, representing a compressive force of 290 tons. In subsequent tests buckling occurred only after an initial deflection of 10 cm was given over a 21.4-meter length and temperature raised to 51°, compressive force being 166 tons. In the test reports it was observed that tightening the bolts securing the tubes would increase lateral rigidity even more.

The laboratory also tested bending strength of the track; the panel was placed on rolls to eliminate frictional resistance to bending and fastened rigidly at both ends. Testing of the zig-zag track showed that 3.5 times the force (applied by a jack to the center of the panel) was required to produce a 12.5-mm deflection as with conventional track construction. The non-elastic part of the deflection was only two per cent of that in other panels.

With the basic design proved in tests and in actual use on short sections of NS line, attention turned to improving the design of the sleeper itself for maximum ease of manufacture and assembly, as well as reduced cost. Manufacture of the initial type was complicated by the need to provide for the wedge and bolt, and a second type was developed in which oval tubes were glued into slots in the block, with no other fastening. For that purpose, a synthetic adhesive, Edilon P 5001, was used. Developed by Edilon NV of Haarlem, the glue has a tensile strength of 350 kg/cm², an e-module of 375 kg/cm², and a compressive strength of 1000

Nouveau type traverse béton

La traverse en béton et le rail long soudé présentent des avantages nombreux à l'ingénieur de la superstructure, tout en créant, surtout ensemble, des problèmes. Dans un effort de résoudre les problèmes spéciaux qui surgissent, les Chemins de Fer Néerlandais ont adopté une nouvelle traverse, d'une construction ingénieuse, économique et de rigidité amplifiée de la structure de la voie.

Neuartige Betonschwellen

Betonschwellen und lange geschweisste Schienen haben für den Eisenbahn-Oberbau viele Vorteile. Zugleich bringt ihre gemeinsame Verwendung ihre Probleme mit sich. Bei einem Versuch, die besonderen Probleme zu lösen, hat die niederländische Eisenbahn eine neue Schwelle eingeführt, die sinnreichen Entwurf, Wirtschaftlichkeit und grössere Haltbarkeit der Strecke in sich vereinigt.

Nuevas traviesas de hormigón

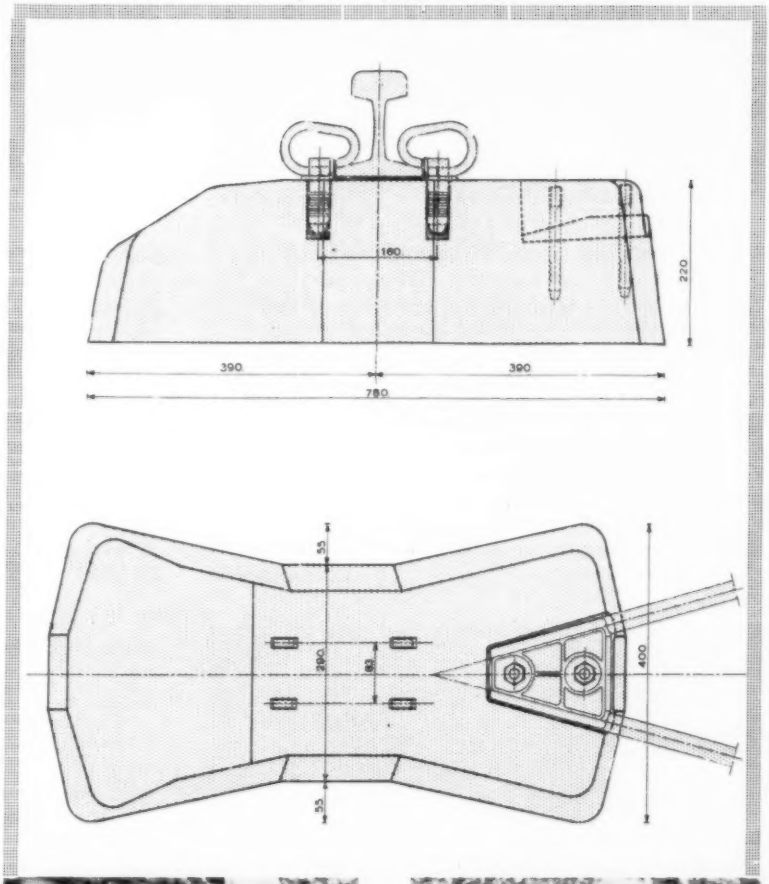
La traviesa de hormigón y el uso de largos rieles soldados ofrece muchas ventajas al ingeniero cargado de la construcción de la superestructura. Sin embargo, la combinación de estos dos elementos plantea problemas. Para solucionar tales problemas los Ferrocarriles holandeses han introducido una nueva traviesa que reune un diseño ingenioso, economía y rigidez de la vía.

kg/cm². This design proved successful and economical in service; however, several factors led to the development of a third design, in which a glued fastening is combined with a bolted plate.

One major factor in the abandonment of the all-glued fastening was the weather found in the Netherlands. Frequent rain produces a situation in which conditions are not always proper for the gluing operation, interrupting and delaying work. The present design permits the bolting of the tubes in place without gluing when required; when weather permits the fastening can be unbolted, glue applied, and the bolted plate replaced. When gluing and bolting is completed, a bituminous mixture is used to cover and protect the entire assembly.

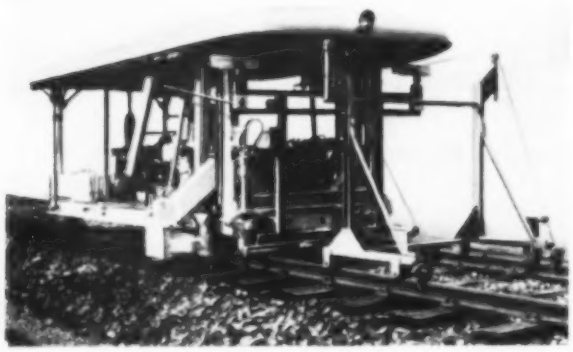
The cost of the zig-zag track compares favorably with that of conventional wooden-sleeper construction. Of the three types of construction, the first and the present designs are comparable in materials cost, while the second, all-glued type is somewhat cheaper. Under Dutch conditions, where wooden sleepers must be imported, the materials cost of the zig-zag track is presently about 68.00 Guilders per meter, compared with about 70.00 for wooden sleepers. Installation cost of the zig-zag track is somewhat higher under present conditions, bringing

CONTINUED ON PAGE 56



Design now in use: tubes are glued into place; bolted plate provides added security.
Type utilisé actuellemt: tubes collés en place, plaques boulonnées de renforcement.
Heute: die Rohre liegen fest; verbolzte Bleche sorgen für zusätzliche Sicherheit.
Diseños de uso actual: tobos pegados en bloques, plancha con pasadores aumenta la solidez.

Permanent Way Products of I



Track Leveling and Tamping Machine

La nouvelle machine pour voies Plasser à triple usage.
Neue Plasser-Streckenmaschine für jede der drei Arten.
Nueva máquina Plasser se puede usar para tres operaciones.

A new track leveling and tamping machine—the Plasser & Theurer Type HM 300 St—can be used in any of three ways: As a lifting machine only, in front of a tamping machine; as a leveling and tamping machine, to bring track to correct height at each sleeper, and tamp; or as a tamping machine alone, with leveling and lifting unit disconnected. It is self-propelled, and light in weight. *Plasser & Theurer, Johannesgasse 3, Vienna I, Austria.* **IRJ 1**

Caterpillar Offers New Tractor-Scrapers

Tracteur-déblayeur Caterpillar modèle 631A d'une nouvelle conception.
Einer der neuen Caterpillar Kleinlok-Abräumer, Modell 631A.
Tractor Caterpillar para desescombro, modelo 631A, 2 nuevos diseños.

Two new wheeled tractor-scrapers—the four-wheel Model 630 Series A and the two-wheel Model 631 Series A—feature torque divider power shift transmission. Both are powered by a new design, four-valve-in-head diesel engine; special heavy-duty tires; "live" air-actuated cable controls that reduce operator effort, advanced design steering systems, and a high degree of service accessibility. *Caterpillar Tractor Co., Peoria, Ill., USA.* **IRJ 2**

One Piece Frogs Feature Long Wear

Croisements Hadfield en manganèse d'une pièce résistent à l'usure.
Hadfields einteilige Mangan-Herzstücke sind sehr widerstandsfähig.
Cruzamientos de manganesa de una pieza, gran resistencia al desgaste.

A one-piece heavy-duty switch frog now in use on the Southern Region, British Railways, features a solid monoblock casting in Hadfields' "ERA" manganese steel. Designed for high-speed running, the frog has an angle of 1 in 28, and a length of 7.62 m, greater than any similar crossing previously used on British railways. It is designed for high resistance to wear with minimum maintenance. *Hadfields, Ltd., Tinsley, Sheffield 9, England.* **IRJ 3**

Developments Ease Track Maintenance

Machines à trois voies améliorées par programme Kalamazoo.
Kalamazoo Entwicklungsprogramm verbessert drei Gleisgeräte.
Kalamazoo perfecciona tres máquinas para conservación de vía.

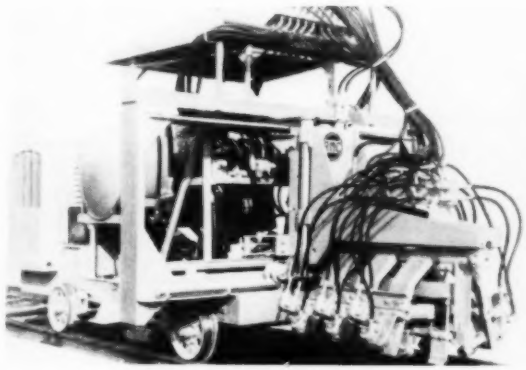
Greater efficiency and operating ease for three widely-used track maintenance machines have resulted from a development program by their manufacturer. The improved machines are the Handyman Power Tamping Jack, now said to be 25% more productive; the No. 40 Ballast Equalizer; and the improved Portable Set-Off, adaptable to most rights-of-way and to most track machines. *Kalamazoo Manufacturing Company, Kalamazoo, Michigan, USA.* **IRJ 4**

Switch Lever for Narrow-Gauge Track

Levier d'aiguillage ajustable Minor construit pour voie étroite.
Minor: verstellbarer Hebelschalter für Schmalspurstrecke.
Palanca de aguja ajustable Minor diseñada para vía estrecha.

The new Minor lightweight two-way self-reversing switch lever has been specially designed for use on narrow-gauge track laid with rail weighing up to approximately 75 kg/m. Having a "still" handle, the lever remains stationary when the switch is trailed. The lever weighs 14.9 kg; adjusts for switch movement of from 6.3 to 9.5 cm; can be mounted flush in concrete or on sleepers spaced 45.7 cm apart. *Henry Williams, Ltd., Darlington, Durham, England.* **IRJ 5**

Interest from Railway Suppliers



'BoltMaster' Tightens, Removes Joint Bolts

Nouvelle machine d'entretien manipule trois joints par minute.
Neue Wartungsmachine für drei Anschlusstücke pro Minute.
Máquina para la conservación de la vía, tres juntas por minuto.

The RMC "BoltMaster" tightens or removes all bolts at rail joints in a single operation. Adaptable for either six- or four-bolt joints, it is based on use of hydraulic torque wrenches mounted on a head which traverses from one rail to the other. Wholly controlled by one man, the machine has a speed of up to three joints per minute. All wrenches may be used together, or separately. *Railway Maintenance Corporation, Box 1888, Pittsburgh 30, Pennsylvania, USA.* **IRJ 6**

Calculator for Curve Correction

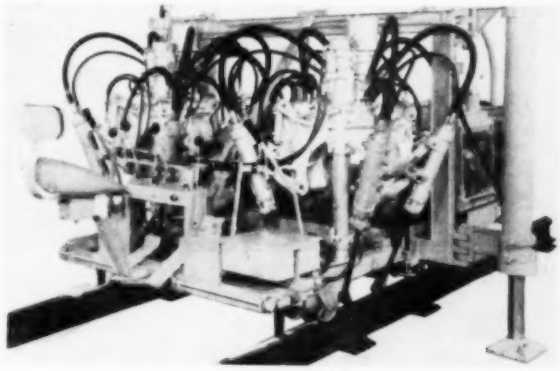
Le calculateur automatique Matisa pour corriger les courbures.
Matisa bringt automatischen Kurven-Korrektionskalkulator.
Aritmografo automatico Matisa para correcciones de curvaturas.

A new model calculator for automatic curve correction includes a unit permitting simultaneous rectification of 30 reference points. By using two or more units together, according to curve length, it is possible to cover 60 or more reference points at once. The calculator, which the manufacturer says is particularly useful on reverse curves, eliminates need to work out any corrections on paper. *Matisa Materiel Industriel, SA, Grand-Pont 2, Lausanne, Switzerland.* **IRJ 8**

Hand-Held Tampers Save Time, Cut Costs

Bourreuse à main Ingersoll-Rand font gagner du temps.
Ingersoll-Rand Handstampfen sparen Seit und Kosten.
Bateadores de mano Ingersoll-Rand, ahorro de tiempo.

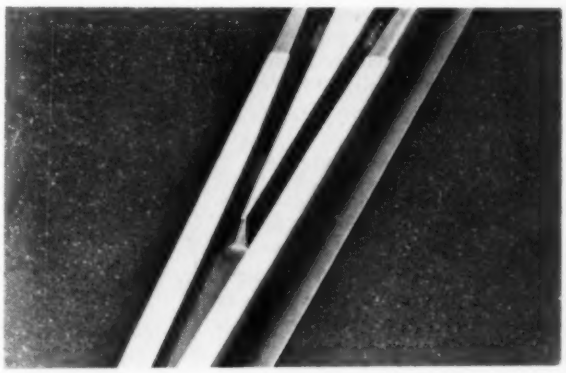
Three new hand-held Sand Wiper backfill tampers are designed to save time and cut costs on construction jobs. They produce desired compaction density on higher lifts than have previously been possible with hand-held tools. A wide selection of butts and peens is available for special requirements. Neoprene felt and leather seals protect the piston and cylinder from entrance of abrasive material. *Ingersoll-Rand, 11 Broadway, New York 4, N. Y., USA.* **IRJ 9**



Gang Tamper Includes Built-In Jacks

Bourreuse multiple Racine "Oct-a-Gun" à crics hydrauliques carénés.
"Oct-a-Gun" Vielfach-Gleisstopfer jetzt in Hydraulik-Winden.
Bateadora "Oct-a-Gun" de Racine con gatos hidráulicos interiores.

The standard Racine "Oct-a-Gun" gang tamper for rail ballasting now comes equipped with a built-in pair of large diameter hydraulic jacks for all types of raising operations. The jacks are broad-based, set beyond the ends of ties, and can lift a total load in excess of 11,000 kg. For traveling, they pivot inside the dimensions of the tamping heads. *Racine Hydraulics & Machinery, Inc., 2000 Albert St., Racine, Wisconsin, USA.* **IRJ 7**



Welded Crossing Frogs Give Long Life

Pointes de croisement soudées Pintsch Bamag ont la vie longue.
Pintsch Bamag: geschweisste Herzstücke liegen länger.
Puntas del corazón soldadas Pintsch Bamag de gran solidez.

Heat-treated crossing frogs made from check rail steel are said to last three times as long as bolted frogs. They can be repaired under traffic, or resurfaced by shop welding. They are available either in partly block-welded construction with wing rails bolted to the welded center block, or in block-welded construction with wing rails welded to the welded center block. *Pintsch Bamag Aktiengesellschaft, Butzbach, Western Germany.* **IRJ 10**

MORE PRODUCTS ON PAGE 44

New Japanese Rotary Plow

Chasse-neige amovible

Elément diésel-hydraulique pouvant être utilisé comme chasse-neige rotative ou comme locomotive construit pour les Chemins de Fers Japonais. La partie amovible sur essieu simple, type brouette.

Abnehmbarer Drehpflug

Eine dieselhydraulische Einheit, die entweder als Drehschneepflug oder als Lok verwendet werden kann, wurde für die japanische Staatsbahn gebaut. Der abnehmbare Pflug ist ein einachsiger Schubkarren-Typ.

Quitanieves desmontable

Unidad diesel-hidráulica que se puede usar como quitanieves rotativo o como locomotora, se ha sido construída para los Ferrocarriles japoneses. El quitanieves desmontable es de tipo carretilla y se monta en un solo eje.

The conventional railway snowplow—especially the costly and relatively complex rotary plow—is an inherently inefficient piece of equipment. Used for only short periods during the year even on railways with major snow-removal problems, it represents a considerable capital investment which must lie idle for by far the greatest part of its useful life. In recent years many different approaches have been made to a solution of the problem; for the Japanese National Railways, the solution appears to be in sight, in the form of a diesel-hydraulic unit which can function as a locomotive when not required for snow-fighting.

In December 1960, Japanese National Railways placed in service the first unit of the new type. Built by Kisha Seizo Kaisha, the plow is the first to be built for JNR since the delivery of the last steampowered rotary plow by KSK in 1950.

Doubles as Locomotive

Principal feature of the new unit—classed as DD14 by the JNR—is that it is essentially a locomotive in design, with rotary plow equipment which can be attached or removed as required.

The locomotive section is of the so-called "hood" type, having a driver's cab on one end, and a B-B wheel arrangement. The unit is equipped with two of the JNR's standard diesel engines, similar to those employed in the standard class DD13 diesel-hydraulic shunting locomotive but upgraded from the existing 370 hp to 500 hp by modifications in supercharger and combustion-chamber design.

In as many respects as possible parts employed in the DD14 conform to those used in the DD13, permitting maximum interchangeability. The cooling system, however, has been completely redesigned: two sets of cooling fans are fitted in the roof of the engine hood, and fan drive is by hydrostatic transmission employing oil pumps and motors.

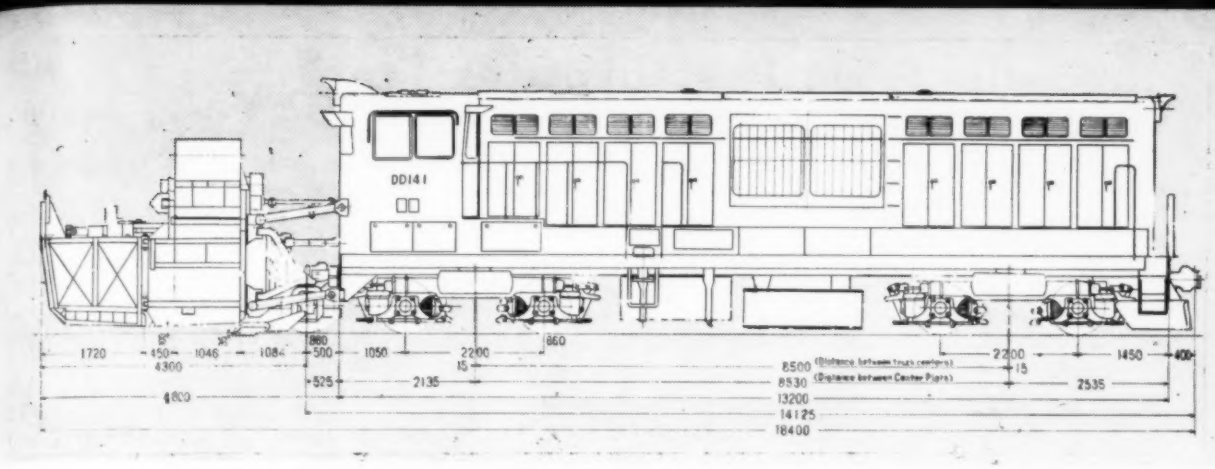
Plow is Removable

The rotary snowplow itself is carried wheelbarrow-fashion on a single axle; the unit is coupled to the main chassis at the cab end of the locomotive unit by four radius links. The plow itself is of the twin-impeller type, with rotors of 1200-mm diameter; working speed is 360 rpm, considerably higher than that of conventional rotary plows. A scraper and flanger are fitted to the plow unit, and side wings to the locomotive unit.

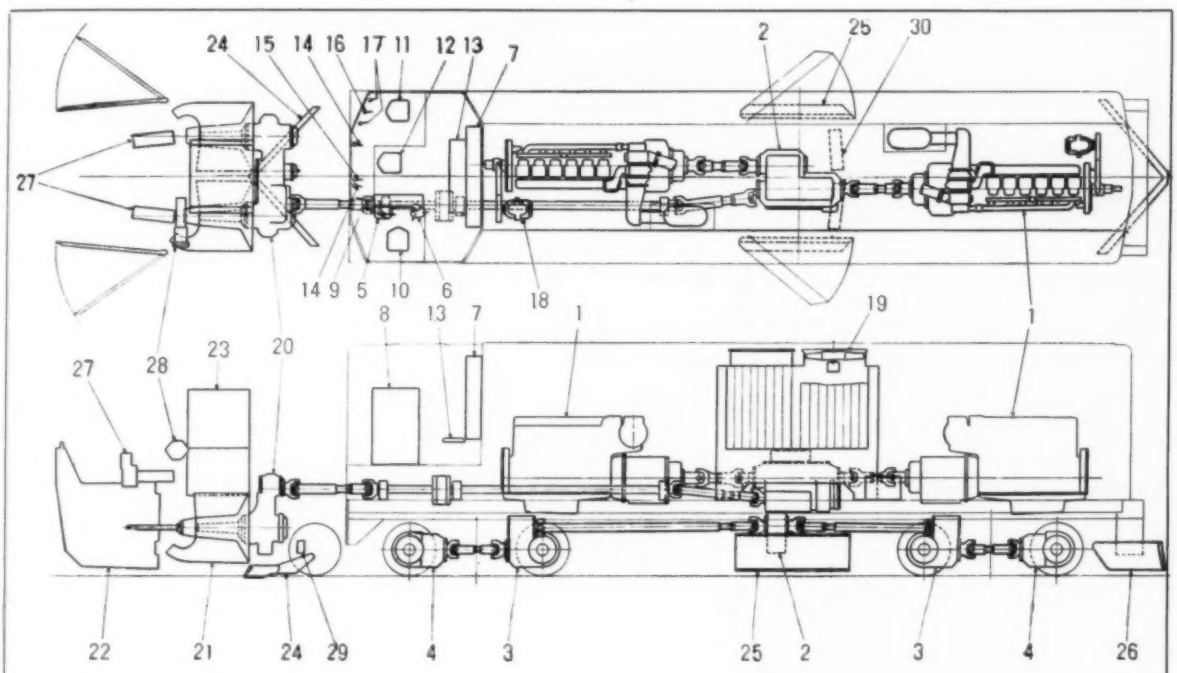
A hydraulic torque converter of the Shinko-SRM type DS 1.2/1.35, built in Japan under license from Svenska Rotor Maskina of Sweden, is directly connected to each engine; power is transmitted to the driving wheels and plow unit through reduction and reversing gearboxes and cardan shafts.

For various operating conditions power transmission can be controlled from the cab to deliver power from both engines to all driving wheels; from both engines to the plow unit (with propulsion provided by another locomotive); or from one engine to the driving wheels of one bogie and from the other engine to the plow.

If performance of the initial unit proves satisfactory, further units will be built for service in the northern part of Japan, particularly on the island of Hokkaido.



w Features High Availability



Principal Dimensions

Weight with plow	69,000 kg
Weight without plow	58,000 kg
Maximum tractive effort	14,500 kg
Maximum speed	70 km/h
Diesel engine:	DMF31SBR
Cylinders	6 — 180 mm × 200 mm
Number of engines × output	2 × 500 hp
Engine speed	1500 rpm
Reduction gear ratio	1:3.143
Batteries	2 × 200 ah
Fuel capacity	2000 liters

1. Diesel engine and hydraulic torque converter.
2. Reversing gearbox.
3. Number 1 reduction gearbox.
4. Number 2 reduction gearbox.
5. Master controller.
6. Brake stand.
7. Control cabinet.
8. Instrument panel.
9. Snowplow rotor controller.
10. Driver's seat.
11. Assistant's seat.
12. Operator's seat for plowing operations.
13. Auxiliary seat.
14. Scraper operating valve.
15. Deflector operating valve.
16. Flanger operating valve.
17. Side wings operating valve.
18. Air compressor.
19. Cooling fan and oil motor.
20. Snowplow reduction gearbox.
21. Plow rotor.
22. Scraper.
23. Deflector.
24. Flanger.
25. Side wing.
26. Rear wedge snowplow.
27. Scraper operating cylinder.
28. Deflector operating cylinder.
29. Flanger operating cylinder.
30. Side wing operating cylinder.

Swiss Plant Prefabricates Track

A centralized track manufacturing and reclamation plant is now in full operation on Swiss Federal Railways. The plant, at Hägendorf, near Olten, is part of the system's continuous process of rationalization.

The central works are responsible for sorting old track and track components and reclaiming those which can be used on more lightly trafficked lines or on sidings. New track is also assembled for distribution over the entire network, which reduces the need for stockpiles in various parts of the system. One section of the plant is devoted to the fabrication of turnouts and crossings. Later, equipment will be installed for dealing with long welded rail.

When it is decided to replace a section of line, the Hägendorf works will provide all the necessary lengths of track in preassembled form. This, in turn, reduces track occupation by the permanent way department. It also cuts costs and reduces the railway's inventory of track materials.

The design and layout of the plant is such that it will allow for future extensions or for changes in manufacturing and assembly techniques. This was felt to be particularly necessary in view of the rapid development of methods, tools and machinery. The layout has also been arranged to make the best possible use of mechanical handling equipment.

The main building for the assembly of turnouts, crossovers, etc., is 187 meters long and 45 meters wide and provides practically unobstructed floor space. The other principal building is devoted to smaller track components. Raw materials are strategically stockpiled outside the buildings, movement being effected by overhead cranes. A short distance from the main buildings and stores are the administrative and staff blocks—the latter incorporating a canteen. There is also a permanent way school.

Permanent Way Products CONTINUED FROM PAGE 41

Emergency Fish Plates Repair Rail Breaks

Des éclisses provisoires permettent réparation temporaire de rail.
Notlaschen für schnelle zeitweise Ausbesserung von Schienen.
Eclisas para emergencias, permiten reparación rápida de rieles.

Emergency joggled fishplates and clamps permit track maintenance men to make quick temporary repairs to broken rail, to allow its use at reduced speeds. They are particularly adapted for repairing breaks which occur at or close to a weld of any type. They are available for any rail section from 25 kg/m up, and can be applied quickly in a few minutes, without special tools. *Henry Williams, Ltd., Railway Appliances Works, Darlington, Durham, England.* **IRJ 11**

'Hydra-Jak' Aids Soil Stabilization, Grouting

Nouveau cric comme pompe pour pose de fondations et pour jointoyer.
Neue Winden als Pumpe für Unterbau, Fugen- oder Auffüllung.
Nuevo gato, operación simultánea como bomba para fundar y rejuntar.

The Airplaco "Hydra-Jak" is designed for such soil cement applications as slab raising and leveling, mud jacking, underpinning, grouting or backfilling in sewers, tunnels and forms. Weighing only 270 kg, it is powered with a 6-hp air-cooled engine; and has a permanently-lubricated roller-chain drive with coil springs. Both features are designed to eliminate mechanical breakdowns. *Air Placement Equipment Company, 1000 West 25th St., Kansas City 8, Missouri, USA.* **IRJ 13**

Spring-Type Rail Fastenings

La Tempered Spring Co. offre trois attaches des rails à ressort.
Tempered Spring Co. liefert drei Feder-Typ Schienenbefestigungen.
Tempered Spring Co. ofrece tres fijaciones del tipo resorte.

Three patented spring-type rail fastenings on which new literature is now available include: 1) The Jaflex spring spike, which combines light weight with maximum holding power and adequate deflection through combination bending-torsion action; 2) a spring hoop and clip rail fastening; and 3) "Railock," a double spring-type spike which both holds and anchors rail. *Tempered Spring Co., Ltd., P.O. Box 17, Warren Street, Sheffield 4, England.* **IRJ 12**

Slim Vibrator Speeds Concrete Work

Le vibrateur de béton Ingersoll Rand permet un meilleur damage.
Ingersoll-Rand Zementvibrator liefert bessere Festigkeit.
Vibrador de hormigón Ingersoll-Rand, permite major compacidad.

The new air-powered 10-V concrete vibrator has been developed for use on average building construction, walls, floor and roof slabs, medium columns and light foundation work. It is said to be capable of producing more perfect compaction of stiffer mixes, while its thin vibrating head allows the tool to work easily between reinforcing bars. It delivers 9000 vibrations per minute at full load. *Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., USA.* **IRJ 14**

Turkey-Iran: New Rail Link

An ambitious start to the construction of a new railway link between Turkey and Iran, along the 2300-year-old route followed by the armies of Alexander the Great on their conquest of the Persian Empire, is among the most dramatic of current railway developments in the Middle East. Completion of the project, perhaps as early as four or five years from now, will provide the benefits of railway transportation to some 3,000,000 people living in the now-remote areas adjacent to the new line. Ultimately, when other projected construction in Iran is completed (IRJ, October 1960), the Turkey-Iran connection will form a part of an unbroken rail route from Western Europe to Pakistan and India.

Construction of the new route, which will be the first direct connection between the railway systems of the two countries, will fulfill a long-standing ambition for improved land communication between Iran and Turkey, as well as between Iran and Western Europe. Until recently, however, the high construction costs for the line, necessitated by the severe topography of eastern Turkey, where the highest mountains exceed 3,500 meters in elevation, have prevented completion of the project.

The route will require 98 km of new line between Mus, the present eastern end of Turkish State Railways (TCDD) track, and Tatvan, on the western shore of Lake Van; a 91-km car ferry crossing of the 4000-square-kilometer lake to Van, on the eastern shore; and another 254 km of new line from Van through the Kotur River Canyon to Sharef Khaneh, Iran, which is now the western end of Iranian State Railways track.

The present effort to complete the railway owes much of its impetus to the Central Treaty Organization (CENTO), made up of Turkey, Iran, Pakistan and the United Kingdom, with the United States as an associate member. At the first session of the organization's Economic Committee in 1956, the Turkey-Iran railway construction was approved as one of the first CENTO joint projects for the economic development of its member nations.

Location surveys for the portion of the route within Turkey were made by the Turkish Ministry of Public Works as early as 1935. Later surveys were made in 1942, and again in 1956–57. Studies for the Iranian portion of the route were first

CONTINUED

Nouvelle ligne reliera la Turquie à l'Iran

La première liaison directe ferroviaire entre la Turquie et l'Iran est en voie de construction. La nouvelle ligne, qui sera achevée dans quatre ou cinq ans, permettra de réaliser une ambition de longue date pour l'amélioration des communications de terre entre les deux pays. Elle apportera les avantages du transport par rail à quelques 3,000,000 de personnes habitant des régions maintenant éloignées, mais à proximité de la ligne, et fera partie d'une liaison ferroviaire ininterrompue entre l'Europe Occidentale et le Pakistan et l'Inde. La nouvelle ligne exigera la construction de 103 km de voie entre Mus, le terminus actuel oriental des chemins de fer de l'état turc (TCDD) et le Lac Van; un trajet de 91 km par ferry-boat pour traverser ce lac; et encore 257 km de voie neuve entre le lac et le terminus occidental actuel des chemins de fer d'état iraniens à Sharef Khaneh. La construction de la section turque progresse bien. La nouvelle ligne devant traverser des terrains montagneux, les frais de construction seront élevés, environ $25 millions US en plus des sommes déjà dépensées pour le projet.

Neue Eisenbahn wird Türkei und Persien verbinden

Zurzeit wird an der ersten Eisenbahn-Direktverbindung zwischen der Türkei und Persien gebaut. Diese Linie, die wahrscheinlich in vier bis fünf Jahren fertiggestellt sein wird, wird einen lang gehegten Wunsch nach einer besseren Landverbindung der beiden Länder erfüllen. Sie wird ungefähr drei Millionen Menschen, die in jetzt abgelegenen, längs der Strecke liegenden Gebieten leben, die Vorteile der Eisenbahnbeförderung bringen, und sie wird einen Teil der ununterbrochenen Bahnverbindung zwischen Westeuropa und Pakistan und Indien bilden. Zwischen Mus, dem heutigen östlichen Endpunkt der türkischen Staatsbahn (TCDD) und Lake Van, wird die neue Linie den Bau einer 103 km langen Strecke erfordern, eine Wagenfähre für die 91 km über den See und weitere 257 km einer neuen Strecke zwischen dem See und dem heutigen westlichen Endpunkt der persischen Staatsbahn bei Sharef Khaneh. Der türkische Abschnitt ist bereits ziemlich weit fortgeschritten. Da die neue Linie gebirgiges Gelände kreuzt, werden die Baukosten hoch sein—wahrscheinlich mehr als $25 Millionen US, zusätzlich zu dem, was bereits für dieses Projekt ausgegeben oder angewiesen wurde.

Nueva línea de ferrocarril entre Turquía e Irán

Se ha inaugurado la construcción de la primera comunicación ferroviaria directa entre Turquía e Irán. La terminación de esta obra, probablemente en cuatro o cinco años, satisfará el deseo, que estos dos países han sentido ya desde hace mucho tiempo, a una comunicación mejorada por tierra. Redundará en beneficio del transporte ferroviario para unos tres millones de habitantes de zonas remotas que cruzará la línea y formará parte de un enlace ferroviario sin interrupción alguna entre Europa occidental y Pakistán e India. La nueva línea hará necesaria la construcción de 103 km de vía férrea entre Mus, el términus actual oriental de los Ferrocarriles del Estado Turcos (TCDD) y el Lago Van; la travesía de este lago por ferrobarco (91 km) y una nueva vía de 257 km entre el lago y el términus occidental de los Ferrocarriles del Estado de Irán en Sharef Khaneh. Se ha inaugurado ya la construcción de la sección turca. Debido a que la nueva línea recorre terrenos montañosos, los costos de la construcción serán muy elevados—unos 25 millones de US$, aparte de lo que ya ha sido gastado para el proyecto.

TURKEY-IRAN CONTINUED

made in the late '30's by a European firm. Most recently, an engineering study and economic report for the entire route, upon which the work now in progress is largely based, was completed by the Chicago, Illinois, consulting engineers' firm of DeLeuw, Cather & Company in 1958.

The DeLeuw, Cather report placed the total estimated cost of the project, for all of the work required between Mus, Turkey, and Tabriz, Iran, in the vicinity of $130 million, exclusive of an estimated $6 million worth of locomotives and rolling stock to operate the new line.

Considerable progress toward the eventual junction of the two railway systems has been made in recent years. In 1955 Turkey completed 105 km of new line which extended the eastern end of TCDD track from Genc to Mus. In 1957 and 1958 Iran placed in operation 304 km of new line, between Mianeh and Tabriz, which completed a standard-gauge route between Tehran, the national capital, and Tabriz, the capital of the important western province of Azerbaijan. Subsequently, the Iranian State Railways has converted to standard gauge 84 km of broad gauge track, originally built by Russian forces in 1914–17, between Tabriz and Sharef Khaneh, which reduced the remaining gap between the railway systems of the two countries to the present 443 km.

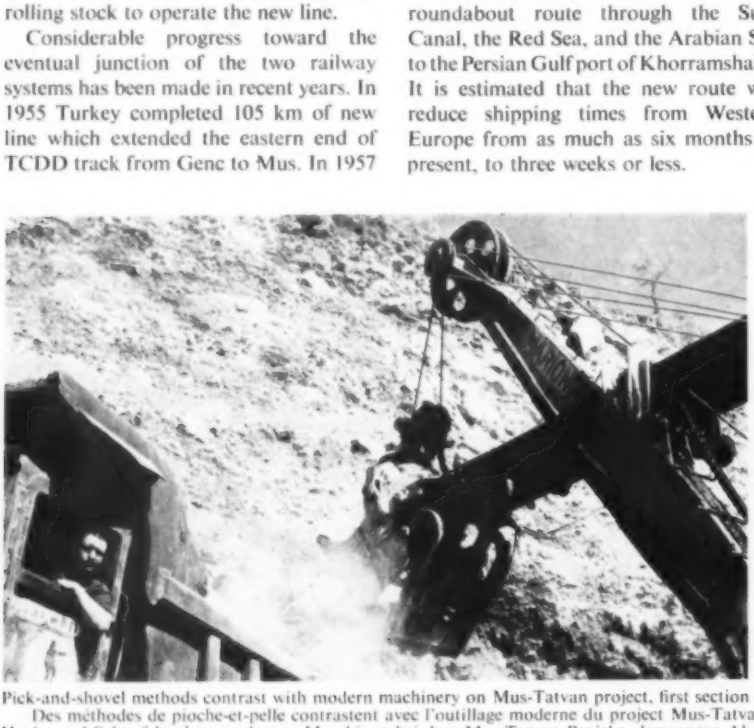
Proponents of the line are highly optimistic about the economic benefits its completion will bring. An increased trade between the two countries, now negligible because of the lack of direct transportation, is foreseen. The availability of rail transportation is expected to stimulate the largely agricultural economy of the area tributary to the route. Although there is presently no significant mineral production along the new route, chromite, copper, iron, zinc, lead, and manganese ores are known to exist. The discovery of deposits in commercially feasible quantities could generate important traffic.

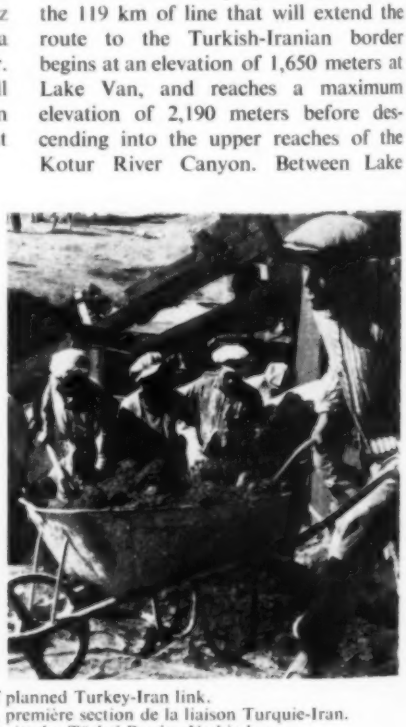
Most important of the benefits foreseen for the new route, however, is the greatly improved trade route that will become available between Iran and Western Europe. In addition to providing an all-rail route to Europe, the line also will create a new rail-water route via the Turkish Mediterranean port of Iskenderun. Presently, goods must travel via a roundabout route through the Suez Canal, the Red Sea, and the Arabian Sea to the Persian Gulf port of Khorramshahr. It is estimated that the new route will reduce shipping times from Western Europe from as much as six months at present, to three weeks or less.

Beginning at an elevation of 1,287 meters, the projected 98-km Mus-Tatvan line will initially follow the Mus Valley and then ascend the west slope of Nemrut Mountain, to reach a maximum elevation of 1,795 meters before descending into the Lake Van basin. Four tunnels, the longest of them 1,100 meters, will be required for this section of the route.

Before adopting plans for the 91-km car ferry crossing of Lake Van, engineers studied two alternate route proposals. The first, a 154-km line around the south shore of the lake, would have had to closely follow the irregular shore line due to the precipitous slopes of the mountains of the Bitlis Massif. An estimated six million cubic meters of rock excavation and 30 km of tunneling would have been required, in addition to extensive cuts and fills and numerous drainage structures. The second alternate, a route around the north shore of the lake, while it would have encountered less severe topography, would have required a line 250 km in length. Engineers estimated that the south shore route would have cost over $90 million, while the north shore route could have been built for slightly over $70 million. The estimated cost for the car ferry crossing, on the other hand, was well under $20 million, including two 1,010-ton capacity diesel-electric car ferries and the terminals at Van and Tatvan, including slips, breakwaters, turning basins, buildings, and a drydock at Tatvan.

East of Van the projected profile for the 119 km of line that will extend the route to the Turkish-Iranian border begins at an elevation of 1,650 meters at Lake Van, and reaches a maximum elevation of 2,190 meters before descending into the upper reaches of the Kotur River Canyon. Between Lake





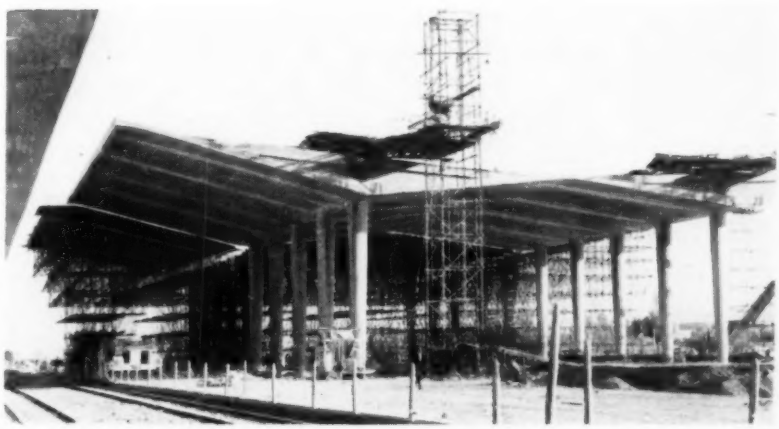
Pick-and-shovel methods contrast with modern machinery on Mus-Tatvan project, first section of planned Turkey-Iran link.
Des méthodes de pioche-et-pelle contrastent avec l'outillage moderne du project Mus-Tatvan, première section de la liaison Turquie-Iran.
Hacke und Schaufel neben modernen Maschinen bei dem Mus-Tatvan Projekt, dem ersten Abschnitt der Türkei-Persien-Verbindung.
Contraste entre metodos sencillos y maquinaria moderna en el proyecto Mus-Tatvan, primera sección del enlace Turquia-Irán.

Van and the border six tunnels, with an aggregate length of 2,010 meters, will be required.

The 135 km of line east from the Iranian border to Sharef Khaneh will include some of the most difficult construction of the entire route. The line descends through the Kotur River Canyon to the Kotur Valley, ascends a ridge in the vicinity of Kara Tapeh Mountain, and then drops down to level ground in the vicinity of Lake Rezaiyeh. The engineering study for the route indicated a requirement for 27 tunnels, totaling over 6 km in length. For a distance of 14 km in the Kotur River Canyon, maintenance of the 1.5% maximum grade established for the remainder of the line would involve serious construction problems, including one bridge 220 meters in length and 70 meters above the river, and a number of costly retaining walls and trestles. Instead the initial report recommended a 2.8% maximum grade for a distance of 14 km, which would necessitate pusher locomotives for westbound traffic. Currently, however, Iranian engineers are studying a general relocation in the Kotur Canyon and Kara Tapeh Mountain area in an effort to establish a more nearly uniform rate of climb that will reduce the 2.8% requirement.

So remote is the Kotur section of the proposed railway that villagers along the route eagerly look forward even to completion of the service road which will precede construction of the railway itself. Scheduled to reach the Turkish border this year, the road will enable motor vehicles to bring medical aid to the villages when needed.

CONTINUED



Modern station at Tabriz, Iran will serve completed line.
Gare moderne à Tabriz, l'Iran desservira la ligne achevée.
Moderner Bahnhof bei Tabriz, für Persiens fertige Linie.
Estación moderna en Tabriz, Irán, servirá la línea.

Present Turkish line ends at Mus; 103-km first stage will reach Lake Van.
Terminus turc actuel à Mus; première phase de 103 km atteindra le Lac Van.
Die heutige türkische Linie endet bei Mus; 103 km weiter erreicht sie Lake Van.
Linea actual turca termina en Mus; primera sección llegará al lago Van.

With the exception of the 14 km of 2.8% westbound grade presently planned near the Iranian border, the planned alignment and profile for the entire new route will maintain a maximum grade of 1.5%, compensated for curves and not exceeding two-thirds of the maximum in tunnels, for both eastbound and westbound traffic. A minimum radius of 600 meters for curves, has been established for the line in Turkey, except at stations, where a minimum radius of 400 meters has been set. Rail weighing 46.303 kg/m, imported from foreign sources, will be used, with creosoted hardwood sleepers, and crushed stone ballast to a depth of 0.45 meters. A 22-meter right of way is planned, except where additional space is required for stations, excavation and embankment slopes, or other construction requirements. Roadbed width will be 6 meters on fill and 8.4 meters in excavation.

Stone masonry and reinforced concrete bridges and culverts, and stone masonry-lined tunnels were recommended. Earthquake-resistant structures were recommended because of the periodic destructive earthquakes occurring in the area.

Operation of the route with diesel-electric locomotives is contemplated. Dieselization of the Iranian State Railways is already virtually complete, but only a modest start on the conversion from steam power has been made in Turkey. Two sidings, with a clear length of 690 meters (sufficient for a train of 50 12.5-meter cars), are planned for each station. Locomotive terminals will be required at Tatvan and Van, in Turkey, and at Rahal in Iran. Freight terminals will be constructed at the same locations.

Within Turkey construction is underway in earnest on the 98 km of line between Mus and Tatvan. The Turkish Ministry of Public Works contracted for grading work on the line beginning in 1959, and during the 1960 March-November construction season some 3,500 men and 60 to 80 pieces of mechanized equipment were being employed in the work, which was being carried forward on a 22 hours a day basis. Completion of the line is scheduled for 1962.

In Iran work is proceeding at a somewhat slower pace. A force of about 800 men is currently at work on grading for a 40-km stretch of line which will extend from Sharef Khaneh to Kara Tapeh. Although some mechanized equipment is in use, much of this work is being done by pick-and-shovel labor. In the vicinity of Kara Tapeh Mountain the original route survey called for no less than 17 tunnels, with an aggregate length of 3,665 meters, in a distance of 30 km. This tunneling requirement may be greatly reduced by the alternate route surveys now in progress.

Thus far, much of the financial aid for the project has come from the US, which in 1957 advanced $2.1 million for survey work, engineering services, and construction supervision for the Iranian portion of the route. Another $6 million was made available to Turkey by the Development Loan Fund in December 1960, for the purchase of construction equipment and rails for the Mus-Tatvan section of the route. Great Britain has also contributed about £100,000 to Turkey for the project, largely in the form of heavy dump trucks. Thus far, local currency allocations by Turkey and Iran have about doubled the hard currency credits advanced by Britain and the US.

The principal problem remaining in the path of early completion of the project is that of the foreign exchange requirement for the construction of the some 214 km of track between Van, Turkey, and Kara Tapeh, Iran. Current estimates by the two countries place the total cost of the remaining work at upwards of $25 million. More than half of this amount must be in hard currencies for the purchase of materials unavailable within the two countries. Both the US and Britain seem somewhat reluctant to advance further funds for the work. Recently, doubts about the economic feasibility of the project have been expressed in these countries.

CENTO officials and the two countries are hopeful, however, that the necessary financial aid can be found, and look forward confidently to a day, not too many years away, when freight and passengers will be able to travel for the first time all the way from Western Europe to Tehran over standard gauge rails.

Hand labor is building 40-km Sharef Khaneh-Kara Tapeh section in Iran.
Main d'oevre pour le trajet de 40 km Sharef Khaneh-Kara Tapeh en Iran.
Den 40-km Abschnitt Sharef Khaneh-Kara Tapeh in Persien baut Menschenhand.
Trabajo manual en la sección Sharef Khaneh-Kara Tapeh en Irán.

Surveyors study alternate to 17-tunnel route near Kara Tapeh.
Etude d'une alternative à la ligne de 17 tunnels près de Kara Tapeh.
Landmesser erforschen alternativ die 17-Tunnelstrecke bei Kara Tapeh.
Agrimensores estudian alternativa para linea de 17 túneles Kara Tapeh.

After Hours with Jim Lyne

NOSTALGIA — One unfailing trait of a lifetime railwayman is his sentimental devotion to the steam locomotive, and the pain he feels at witnessing its rapid disappearance. At the same time, I have seen singularly little resistance to the substitution of diesels, once their superior economy was demonstrated. Indeed, sentimental devotees of the steam locomotive "outside" the railways sometimes regard railwaymen as akin to traitors when they "succumb to the diesel."

I am not certain that railwaymen free themselves of sentiment and tradition quite so easily in all areas as they do in the adoption of innovations in technology. The railways in North America, for example, still use five or six men to man a freight train—a hold-over from the days before there were electric signals, instantaneous communication and power brakes.

WHAT TRANSPORT TO FAVOR — A few months ago I had the opportunity to view the Central do Brazil's large suburban passenger operation at Rio de Janeiro—600,000 passengers daily, moved up to 65 km at a charge of approximately 1 cent (US) per passenger-journey. Of course, the operation suffers a large deficit, which is borne by the state.

In the USA, passenger travel into and out of big cities is even more heavily subsidized—but travel by highway, not by rail, receives public assistance.

If the state is committed to subsidizing urban transport from the public treasury, it can provide a great many more passenger-kilometers by a given expenditure on railway service, than from the same expenditure on aid to highway travel. Judged by such a yardstick, it seems to me that Brazil's choice of the form of urban transport to be aided by the state has been a lot more prudent and thrifty than the USA's.

WHAT'S ECONOMICAL? — A professor of engineering at the University of Illinois, W. W. Hay, drew attention at a recent conference to the relative engineering characteristics of the several forms of transport. At 64.36 km/h (40 mph) resistance per ton for a large railroad freight car (50 US or 45.36 metric tons net load) would be 6 lb (2.72 kg); for a large highway semi-trailer (30 tons US or 27.22 tons metric net load), 31.7 lb (14.37 kg); for a bulk cargo ship (10,000 net tons US; 9,072 net tons metric), 133 lb (60.33 kg). At slower speeds, the resistance values decline greatly, but still leave the railway the most efficient of the three.

In horsepower per net ton (US), the railway index stands at 2.64 for freight and 5.00 for passengers; highway semitrailers at 7; passenger automobiles at 15; bulk cargo shipping at 0.25, and cargo planes at 500.

At level grade, a cargo ship moves 8 US or 7.26 metric tons a distance of 100 mi (160.9 km) per gallon (3.78 liters) of fuel; a freight train 5.4 US or 4.9 metric tons per gallon, and a highway semi-trailer only slightly more than one ton US (less than one metric ton). In conservation of land for transportation, professor Hay reports that 18 highway lanes 3.7 meters (12 ft) wide would be required to transport the same number of passengers which a two-track railway line could move.

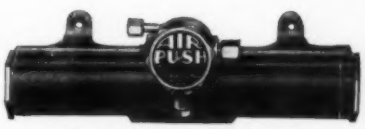
Professor Hay's highly important technological comparisons of the several forms of transport are explored in detail in his new book, "An Introduction to Transportation Engineering."

The railways have nothing to fear, and a very great deal to gain, from such inquiries as those of Professor Hay. The superior economy of railways for most transportation work lacks adequate recognition, because human factors cloak its superiorities.

These three locomotives—Southern Pacific, Union Pacific and Santa Fe—are equipped with safe, sure, dependable Air-Push Windshield Wiping Equipment, as are 95% of all modern diesel locomotives. Designed for heavy duty, all-weather service with minimum maintenance.

...all equipped with SPRAGUE *Air-Push* Windshield Wipers!

Air-Push Jumbo Rotary Seal Windshield Wiper Motor— "standard" of the industry.



SAFETY STARTS WITH SEEING!

Export Dept.: 38 S. Dearborn St., Chicago 3, Ill., U.S.A. In Sterling block: Laycock Engineering Co., Ltd., Millhouses, Sheffield, England

Sprague DEVICES, INC.
MICHIGAN CITY, INDIANA

With the exception of the 14 km of 2.8% westbound grade presently planned near the Iranian border, the planned alignment and profile for the entire new route will maintain a maximum grade of 1.5%, compensated for curves and not exceeding two-thirds of the maximum in tunnels, for both eastbound and westbound traffic. A minimum radius of 600 meters for curves, has been established for the line in Turkey, except at stations, where a minimum radius of 400 meters has been set. Rail weighing 46.303 kg/m, imported from foreign sources, will be used, with creosoted hardwood sleepers, and crushed stone ballast to a depth of 0.45 meters. A 22-meter right of way is planned, except where additional space is required for stations, excavation and embankment slopes, or other construction requirements. Roadbed width will be 6 meters on fill and 8.4 meters in excavation.

Stone masonry and reinforced concrete bridges and culverts, and stone masonry-lined tunnels were recommended. Earthquake-resistant structures were recommended because of the periodic destructive earthquakes occurring in the area.

Operation of the route with diesel-electric locomotives is contemplated. Dieselization of the Iranian State Railways is already virtually complete, but only a modest start on the conversion from steam power has been made in Turkey. Two sidings, with a clear length of 690 meters (sufficient for a train of 50 12.5-meter cars), are planned for each station. Locomotive terminals will be required at Tatvan and Van, in Turkey, and at Rahal in Iran. Freight terminals will be constructed at the same locations.

Within Turkey construction is underway in earnest on the 98 km of line between Mus and Tatvan. The Turkish Ministry of Public Works contracted for grading work on the line beginning in 1959, and during the 1960 March-November construction season some 3,500 men and 60 to 80 pieces of mechanized equipment were being employed in the work, which was being carried forward on a 22 hours a day basis. Completion of the line is scheduled for 1962.

In Iran work is proceeding at a somewhat slower pace. A force of about 800 men is currently at work on grading for a 40-km stretch of line which will extend from Sharef Khaneh to Kara Tapeh. Although some mechanized equipment is in use, much of this work is being done by pick-and-shovel labor. In the vicinity of Kara Tapeh Mountain the original route survey called for no less than 17 tunnels, with an aggregate length of 3,665 meters, in a distance of 30 km. This tunneling requirement may be greatly reduced by the alternate route surveys now in progress.

Thus far, much of the financial aid for the project has come from the US, which in 1957 advanced $2.1 million for survey work, engineering services, and construction supervision for the Iranian portion of the route. Another $6 million was made available to Turkey by the Development Loan Fund in December 1960, for the purchase of construction equipment and rails for the Mus-Tatvan section of the route. Great Britain has also contributed about £100,000 to Turkey for the project, largely in the form of heavy dump trucks. Thus far, local currency allocations by Turkey and Iran have about doubled the hard currency credits advanced by Britain and the US.

The principal problem remaining in the path of early completion of the project is that of the foreign exchange requirement for the construction of the some 214 km of track between Van, Turkey, and Kara Tapeh, Iran. Current estimates by the two countries place the total cost of the remaining work at upwards of $25 million. More than half of this amount must be in hard currencies for the purchase of materials unavailable within the two countries. Both the US and Britain seem somewhat reluctant to advance further funds for the work. Recently, doubts about the economic feasibility of the project have been expressed in these countries.

CENTO officials and the two countries are hopeful, however, that the necessary financial aid can be found, and look forward confidently to a day, not too many years away, when freight and passengers will be able to travel for the first time all the way from Western Europe to Tehran over standard gauge rails.

Hand labor is building 40-km Sharef Khaneh-Kara Tapeh section in Iran.
Main d'oevre pour le trajet de 40 km Sharef Khaneh-Kara Tapeh en Iran.
Den 40-km Abschnitt Sharef Khaneh-Kara Tapeh in Persien baut Menschenhand.
Trabajo manual en la sección Sharef Khaneh-Kara Tapeh en Irán.

Surveyors study alternate to 17-tunnel route near Kara Tapeh.
Etude d'une alternative à la ligne de 17 tunnels près de Kara Tapeh.
Landmesser erforschen alternativ die 17-Tunnelstrecke bei Kara Tapeh.
Agrimensores estudian alternativa para linea de 17 túneles Kara Tapeh.

After Hours with Jim Lyne

NOSTALGIA — One unfailing trait of a lifetime railwayman is his sentimental devotion to the steam locomotive, and the pain he feels at witnessing its rapid disappearance. At the same time, I have seen singularly little resistance to the substitution of diesels, once their superior economy was demonstrated. Indeed, sentimental devotees of the steam locomotive "outside" the railways sometimes regard railwaymen as akin to traitors when they "succumb to the diesel."

I am not certain that railwaymen free themselves of sentiment and tradition quite so easily in all areas as they do in the adoption of innovations in technology. The railways in North America, for example, still use five or six men to man a freight train—a hold-over from the days before there were electric signals, instantaneous communication and power brakes.

WHAT TRANSPORT TO FAVOR — A few months ago I had the opportunity to view the Central do Brazil's large suburban passenger operation at Rio de Janeiro—600,000 passengers daily, moved up to 65 km at a charge of approximately 1 cent (US) per passenger-journey. Of course, the operation suffers a large deficit, which is borne by the state.

In the USA, passenger travel into and out of big cities is even more heavily subsidized—but travel by highway, not by rail, receives public assistance.

If the state is committed to subsidizing urban transport from the public treasury, it can provide a great many more passenger-kilometers by a given expenditure on railway service, than from the same expenditure on aid to highway travel. Judged by such a yardstick, it seems to me that Brazil's choice of the form of urban transport to be aided by the state has been a lot more prudent and thrifty than the USA's.

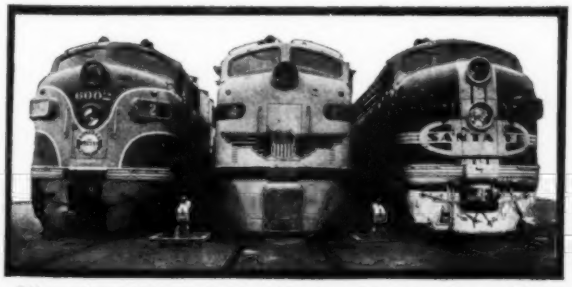
WHAT'S ECONOMICAL? — A professor of engineering at the University of Illinois, W. W. Hay, drew attention at a recent conference to the relative engineering characteristics of the several forms of transport. At 64.36 km/h (40 mph) resistance per ton for a large railroad freight car (50 US or 45.36 metric tons net load) would be 6 lb (2.72 kg); for a large highway semi-trailer (30 tons US or 27.22 tons metric net load), 31.7 lb (14.37 kg); for a bulk cargo ship (10,000 net tons US; 9,072 net tons metric), 133 lb (60.33 kg). At slower speeds, the resistance values decline greatly, but still leave the railway the most efficient of the three.

In horsepower per net ton (US), the railway index stands at 2.64 for freight and 5.00 for passengers; highway semitrailers at 7; passenger automobiles at 15; bulk cargo shipping at 0.25, and cargo planes at 500.

At level grade, a cargo ship moves 8 US or 7.26 metric tons a distance of 100 mi (160.9 km) per gallon (3.78 liters) of fuel; a freight train 5.4 US or 4.9 metric tons per gallon, and a highway semi-trailer only slightly more than one ton US (less than one metric ton). In conservation of land for transportation, professor Hay reports that 18 highway lanes 3.7 meters (12 ft) wide would be required to transport the same number of passengers which a two-track railway line could move.

Professor Hay's highly important technological comparisons of the several forms of transport are explored in detail in his new book, "An Introduction to Transportation Engineering."

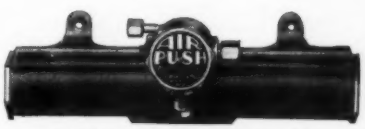
The railways have nothing to fear, and a very great deal to gain, from such inquiries as those of Professor Hay. The superior economy of railways for most transportation work lacks adequate recognition, because human factors cloak its superiorities.



These three locomotives—Southern Pacific, Union Pacific and Santa Fe—are equipped with safe, sure, dependable Air-Push Windshield Wiping Equipment, as are 95% of all modern diesel locomotives. Designed for heavy duty, all-weather service with minimum maintenance.

...all equipped with SPRAGUE *Air-Push* Windshield Wipers!

Air-Push Jumbo Rotary Seal Windshield Wiper Motor— "standard" of the industry.



SAFETY STARTS WITH SEEING!

Export Dept.: 38 S. Dearborn St., Chicago 3, Ill., U.S.A. In Sterling block: Laycock Engineering Co., Ltd., Millhouses, Sheffield, England

Sprague DEVICES, INC.
MICHIGAN CITY, INDIANA

SWEDEN

tainers, 18,756 large containers, for road-rail service, and 41 other large containers; as of October an additional 1587 privately-owned small containers and 959 large private containers were also included in the total. Small containers have capacities of one, two or three m³; large containers, 11, 7.5 and 7.6 m³. Total 1959 tonnage was 4,105,800 tons, as compared with 3,276,800 in 1958; large containers accounted for about three-fourths of the 1959 total, about two-thirds in 1958. Average length of haul in 1958 was 269 km. Small containers and non-standard large containers are interchanged with all railways belonging to the RIV group, standard large containers with all standard-gauge lines in the group. Small and non-standard large containers can be transferred by sea to Great Britain, Ireland, Sweden, Norway and Finland. A number of large containers are also owned by Contrans of Hamburg and used for overseas shipment from DB points. Private containers are handled when approved by member railways of UIC.

• **Italian State Railways:** Use containers exclusively for less-than-carload traffic, have used containers since 1934, and presently have 1779 containers—1660 small and 119 large. Average capacity of small containers is one cubic meter, 500 kg. Traffic in 1959 comprised 3300 tons; average length of haul was 534 km, up from 491 km in 1958. Containers are interchanged with other UIC railways in accordance with international agreement, and private containers, in the exclusive service of their owners, are handled. Expansion is planned in the use of large containers (12 m³) to meet specific traffic needs.

• **Japanese National Railways:** Have 650 large containers and 30 small cold-storage containers. In addition, 169,411 privately-owned small containers have been approved for JNR use. Large containers have an average capacity of five tons, 14 m³. Small refrigerator containers hold 300 kg, have a capacity of .63 m³; all shipper-owned containers have a capacity of less than one ton. A total of 82,114 tons were handled in five-ton containers from 11 November 1959 to 31 March 1960. Average length of haul for large containers was 545.4 km. Large containers measure 2200 × 2050 × 3140 mm inside; have a tare weight of one ton. Container traffic in 1959 amounted to a small portion of total freight traffic, but is expected to play an increasing role in combating road transport. All-container trains were inaugurated in 1959 between Tokyo and Osaka, with a timetable of 10 hours 55 minutes for the 553-km run, and similar service was started to four other sections in 1960. Experiments have been conducted with self-propelled electric container cars, and trains of such cars are contemplated for the Tokaido standard-gauge line now under construction and due for completion in 1964.

• **Mogiana Railway:** Does not presently use containers but plans to inaugurate such service in the near future: "Use of containers, piggyback and special freight cars is essential to combat road competition."

• **Panama Railroad:** Owns no containers but does handle containers owned by ocean shipping lines and private shippers, and provides road service for container shipments. Container traffic amounted to three per cent of total freight traffic in 1959.

• **South African Railways:** Own 253 containers, have another 100 on order. Average capacity is five tons and containers are of a convertible road-rail (Piggyback) type. Approximately 2,500,000 tons were handled in 1959, up 200,000 tons from 1958; average lengths of haul were 425 and 346 km, respectively. SAR furnishes road service for containers and private containers are handled; no interchange but containers operate into the Federation of Rhodesia and Nyasaland. Traffic in containers comprised about 1.7 per cent of the total freight, and container service is being extended.

• **Sudan Railways:** "Conditions in this country have not so far justified the use of containers but the need is growing and it is a feature of our services for future adoption which we are watching closely."

CONTINUED ON PAGE 56

VIET NAM

THE B60 TAMPING MACHINE

guarantees by means of

THE MATISA AUTOMATIC LEVELLING EQUIPMENT

a cross level and longitudinal levelling to within ±1 mm.

MATÉRIEL INDUSTRIEL S.A.

TÉL. 23 77 72 **GRAND-PONT 2** **LAUSANNE**

Télégr.: Matisa-Lausanne **(Suisse)**

New International Selling Opportunity for Railway Suppliers

Your advertising can reach 10,000 world railway executives in ONE magazine!

Now, in International Railway Journal, your advertising message can reach the growing *world-wide* market for railway products economically and efficiently . . . in *one* magazine. In these pages, you sell to a global audience of 10,000 decision-making railroad executives, covering virtually every railroad in over 50 nations. IRJ is a *separate* international publication . . . *not* a foreign edition of a U. S. magazine. Note that IRJ is printed in English with editorial summaries in Spanish, French, and German (shown at right). This makes IRJ useful to the widest possible world audience. Editorial coverage is global, yet *local* . . . with IRJ correspondents at principal world railway centers. Take advantage of this unique opportunity to increase world-wide distribution for your railway products and services. Make your 1961 space reservations now. (May issue closes April 1.)

CHARTER ADVERTISERS INCLUDE:

(October, January and February Advertisers)

AEG Allgemeine Elektricitäts Gesellshaft
Alco Products, Inc.
American Brake Shoe Co.
Bell Punch Export Co., Ltd.
Thomas Bolton & Sons, Ltd.
California Texas Oil Co.
Cardwell-Westinghouse Co.
Cowans Sheldon & Co., Ltd.
Cullen-Frieste lt Company
Fairmont Railway Motors, Inc.
L. B. Foster Co.
General Electric Co.
General Motors Overseas
General Railway Signal Co.
General Steel Castings Corp.
Henschel-Werke
Holman Brothers, Ltd.
Jackson Vibrators, Inc.
Joyce-Cridland Company
Kershaw Manufacturing Co.
Lightalloys, Ltd.
W. H. Miner, Inc.
National Malleable & Steel Castings Co.
Poor & Company
Railway Educational Bureau
Rolls-Royce, Ltd.
Sprague Devices, Inc.
Spray Products Corp.
Standard Telephones & Cables, Ltd.
Stucki Company, A.
Timken Roller Bearing Co.
Travelift & Engineering, Inc.
Union Carbide & International Co.
Union Switch & Signal Co.
Van Der Horst Corp.
Vapor International Corp., Ltd.
A. W. Williams Inspection Co., Inc.

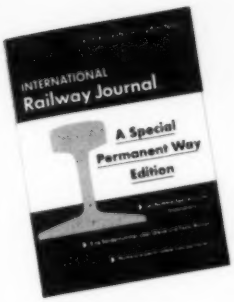
International Railway Journal is published by Simmons-Boardman, leading publisher of Railway magazines in North America . . . with more than a century of railway publishing experience.

SALES OFFICES: LONDON S.W. 1, ENGLAND, 67/68 Jermyn Street, St. James's, Telephone: TRAfalger 6318. Harrogate, Yorkshire, 11 Tewit Well Road. DUSSELDORF GERMANY, Huttenstrasse 17, Am Ernst-Reuter-Platz. TOKYO, JAPAN, No. 1 Kotohira-Cho Shiba Minato-Ku, International Media Representatives, Ltd. NEW YORK 7, New York, 30 Church Street, Telephone: WOrth 4-3060.

INTERNATIONAL RAILWAY JOU

POSTBUS 305 THE HAGUE, HOLLAND

(Advertisement)



RESUME

Voici une nouvelle possibilité de ventes internationales pour les fournisseurs de matériel ferroviaire... Aujourd'hui votre message publicitaire peut atteindre 10.000 dirigeants de chemins de fer du monde entier, d'une manière économique et efficace, en *un seul* magazine... l'International Railway Journal qui couvre virtuellement tous les chemins de fer dans plus de 50 pays. IRJ est une publication internationale en soi, (non pas une édition américaine pour l'étranger) imprimée en anglais, avec des résumés rédactionnels en espagnol, en français (comme celui-ci) et en allemand.

Profitez de cette occasion unique pour augmenter la distribution mondiale de vos produits. Réservez dès maintenant votre espace publicitaire pour 1961.

RESUMEE

Eine neue internationale Verkaufsmöglichkeit für Lieferanten von Eisenbahnmaterial... Jetzt kann Ihre Werbung 10.000 Eisenbahnbetriebsleiter der ganzen Welt wirtschaftlich und wirksam in einer *einzigen* Zeitschrift erreichen... International Railway Journal berührt praktisch jede Eisenbahngesellschaft in mehr als 50 Ländern. IRJ ist eine internationale Zeitschrift für sich, (also keine amerikanische Ausgabe fürs Ausland) welche auf Englisch gedruckt wird mit redaktionellen Resumees auf Spanisch, Französisch und Deutsch (wie dieses). Benutzen Sie diese einzigartige Gelegenheit um den Weltvertrieb Ihrer Produkte zu erhöhen. Bestellen Sie schon heute Ihre Reklame für das Jahr 1961.

RESUMEN

Nueva oportunidad ofrecida a los abastecedores ferroviarios para vender en el mercado internacional. Ahora cada anuncio puede llegar a 10,000 dirigentes ferroviarios en todo el mundo... y de un modo económico y eficiente, en *una sola* revista. International Railway Journal es leída prácticamente por todos los grupos ferroviarios de más de 50 países. IRJ es una revista internacional *autónoma* (no una edición extranjera de alguna revista norteamericana) que se publica en inglés con resúmenes en español (como éste), francés y alemán. Aproveche esta excepcional oportunidad para aumentar la distribución mundial de sus productos para ferrocarriles. Reserve espacio para su anuncio en 1961, pero hágalo sin demora.

AY JOURNAL

World Market CONTINUED

▶ *Mexico*—The Export-Import Bank (USA) has authorized a credit of $13,800,000 to Nacional Financiera, S.A., an agency of the Mexican government, to help implement a long-range improvement program for the National Railways of Mexico. Proceeds will be used to acquire, from the United States, 49 diesel locomotives of varying horsepower; track construction and maintenance materials and tools; track and floor scales; and signaling, communications, telephone and telegraph equipment. New rail will be laid from Chihuahua to Jimenez and from Monterrey to Matamoros. Steel, Peech & Tozer, subsidiary of United Steel Companies, Sheffield, England, are to supply railway axles and wheels worth £750,000 to Mexico over the next 10 months.

▶ *New Zealand Government Railways*—Are in the market for engines and hydraulic torque converters for 260-hp, 1.067-meter-gauge diesel-hydraulic locomotives.

▶ *Pakistan*—The government of Pakistan is inviting bids for steel for sheds, bridge girders and rail fittings; mechanical, electrical and earth-moving machinery; track machinery; survey instruments; laboratory and signaling equipment; equipment for diesel locomotive backshops and for locomotive and car shops, and telephone equipment.

▶ *Rêde Ferroviária Federal SA (Brazil)*—Has ordered the following locomotives: From International General Electric—108 600-hp diesel-electric switchers, 65 900-hp general-purpose diesel-electrics, and six 4400-hp electrics; from General Motors Overseas—55 general-purpose diesel-electrics, including 31 of 875 hp and 24 of 1310 hp.

▶ *Sorocabana (Brazil)*—Has ordered from General Motors Overseas 15 875-hp general-purpose diesel-electric locomotives.

▶ *Sudan Gezira Board*—Has ordered from Hunslet Engine Co., Ltd., Leeds, England, 18 135-hp diesel-mechanical locomotives for the Managil extension.

▶ *Syria*—The El-Ghab Project Administration, Syrian Region, United Arab Republic, has invited bids for railway bridge construction on the Orontes river, near Harb-Nefse.

▶ *Taiwan Railway Administration*—Has ordered from General Motors Overseas 31 general-purpose diesel-electric locomotives, including 26 of 1310-hp and five of 875-hp.

▶ *Toronto Transit Commission*—Has ordered from Montreal Locomotive Works 36 lightweight subway cars, costing $3,900,000, for use on the University extension of the city subway.

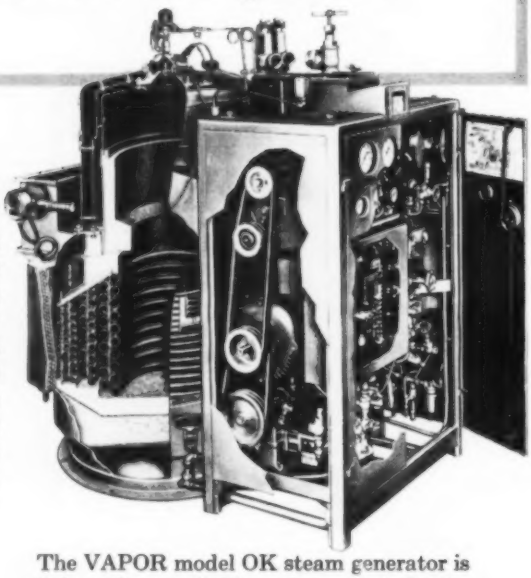
▶ *Tunisian National Railways (SNCFT)*—Have invited registered architects and engineers to compete in preliminary plans for a station to be built in Tunis. Plans should be sent to SNCFT, 67 rue de Portugal, Tunis, Tunisia, by 1 June.

▶ *Yugoslavia*—A Development Loan fund of $5,200,000 will assist in procurement from the United States of 21 diesel locomotives for the Yugoslav Railways. The locomotives will be used for partial dieselization of a line between Belgrade and Skopje via Lapovo.

(Advertisement)

VAPOR PRODUCTS

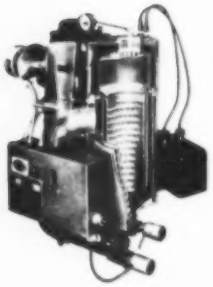
serving railroads for over 50 years



VAPOR equipment for steam, hot water or electric heating has been used by railroads throughout the world for over 50 years. Vapor makes complete heating systems—heat source, radiation, valves and thermostatic controls.

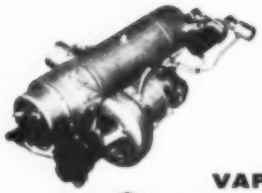
The VAPOR model OK steam generator is light, robust, reliable and compact. Statistics of OK-4616: sustained output—750 kg/h; weight—1,350 kg; overall dimensions—165 x 110 x 160 cm. Similar models available with outputs ranging from 225 to 2,000 kg/h.

The VAPOR Thermostat shown here is one of the models designed for railroad heating and air conditioning systems. VAPOR Thermostats manufactured to rigorous standards flatten the curve of temperature variation to within one degree centigrade.



EQUIPMENT MADE IN HOLLAND

Also illustrated is the compact VAPOR W-120 Circulating Water Heater (approx. 115 kg and 70 x 40 x 48 cm, with 32,000 kg Cal/h output) for heating diesel railcars and locomotives. Automatically maintains temperature of engine coolant to assure full operating efficiency.



Also available for lower heat output requirement the B-70 heater with a capacity of 16,000 kg. Cal.

for complete information write to...

VAPOR INTERNATIONAL CORP., LTD.

224 South Michigan Avenue, Chicago 4, Illinois, U.S.A.

or

VAPOR INTERNATIONAL CORP., HOLLAND N.V.

Breukelen, Holland

PHOTOGRAMMETRY

CONTINUED FROM PAGE 37

computations and design—offers seven major advantages:

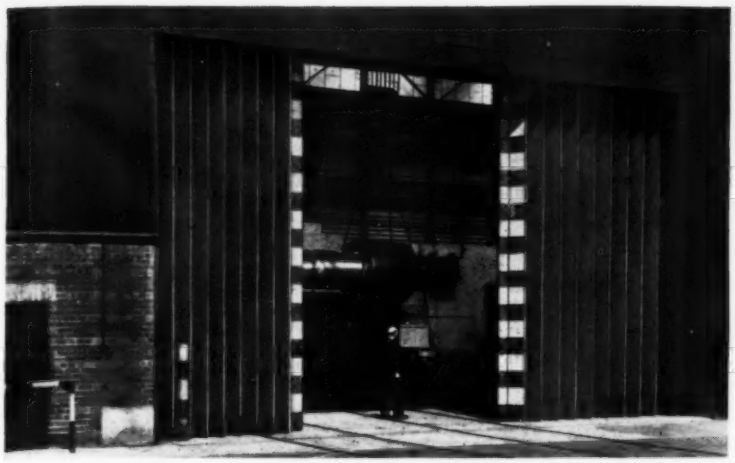
1. Photogrammetry provides the location engineer with pertinent, dependable terrain data over a much broader area than can be inspected economically on the ground. Consequently, he can sample more alternatives to achieve the best possible design.
2. An accurate, three-dimensional optical model of the entire terrain is at hand. Frequent reference to the stereomodel can be made during the design stage; additional measurements can be made; problem areas can be studied.
3. Rugged terrain does not influence the accuracy of photogrammetric surveys, nor materially slow their progress.
4. Aerial photos provide a rapid and indisputable record of progress.
5. Cross sections photogrammetrically obtained record the shape of the terrain more accurately than cross sections surveyed on the ground.
6. The possibility of human error is reduced since the cross section data are punched on tape, the computations performed electronically, and the cross sections drawn automatically.
7. The aerial photos obtained at different stages of construction are of real value in observing erosion and drainage problems, and will aid in anticipating future maintenance problems.

IBM input unit with EA Electro Dataplotter is used in calculating earthmoving information.

Appareil IBM d'entrée avec EA Electro Dataplotter pour calculer l'égalisation du sol.

IBM Aufnahmeeinheit mit elektronischen Datenspeicher für Berechung von Erdarbeiten.

Unidad IBM con ea Electro Dataplotter se usa para cómputos de desescombro.



One pair of electrically operated Bolton Patent Shutter Doors nearly 34 ft. wide and 20 ft. between tracks.

- *Sizes up to 30 ft. high x 200 ft. wide.*
- *Patent, totally enclosed box-type top track.*
- *Self cleaning bottom track.*
- *Manganese bronze hinging strips.*
- *Shutter leaves of 16's gauge mild steel, heavily Sherardised for complete resistance to rust.*
- *Dust resisting, draught resisting, fire resisting.*
- *Wide variety of finishes.*

Write for literature, ref: IJ 379

An open & shut case *for* **BOLTON** *Shutter Doors*

All over the world and on all kinds of buildings, Bolton Shutter Doors are proving their superiority on all points: ease of operation, freedom from maintenance and continuing resistance to wear. Every door is custom built and special needs such as clearance of railway lines or accommodation for runway beams are readily answered.

BOLTON

The BIG name in doors

BOLTON GATE CO. LTD. BOLTON LANCASHIRE ENGLAND

Agents throughout the world.

BG 379

CONCRETE BLOCK SLEEPERS WITH ZIG-ZAG-TIEING

SES

MAATSCHAPPIJ VOOR SPOORWEGBOVENBOUW

Postbus 25 - ALPHEN AAN DEN RIJN - (Holland)

Representative: VACUUM CONCRETE (Paris)

8, Chaussée d'Antin, Paris-9

WORLD POLL CONTINUED

• **Swedish State Railways:** Began container service in 1952 and now have about 8000 containers in service. Containers in use have capacities of from one to five tons, one to 7.6 m³. Traffic amounted to 82,000 tons in 1959, 71,000 tons in 1958; containers are interchanged with other railways but not with other modes of transport. Privately-owned containers are handled. Containers accounted for 0.3 per cent of total traffic, 3.9 per cent of less-than-carload shipments in 1959, and the service is being extended. "We are of the opinion that the container traffic will extend very much in our country."

SWITZERLAND

• **Swiss Federal Railways:** Have 3098 small containers and 587 large containers now in service; service was first offered in 1949. Small containers have an average capacity of one ton, large containers five tons; small units range from one to three m³, large containers from seven to twelve. Container traffic in 1959 was 76,131 tons in small containers, 120,506 tons in large containers; 1958 figures were 40,858 tons and 114,699 tons, respectively. Containers are interchanged with other railways and with road transport firms, and private containers are handled; Swiss Federal provides road service only for door-to-door pickup and delivery. Containers accounted for one per cent of total traffic in 1959; they are used chiefly to meet road competition, and service will be extended as road competition dictates.

• **Taiwan Railway Administration:** Containers are not presently in use but container freight service is to be introduced in late 1961. Two sizes of small containers are to be used.

• **Viet Nam Railway System:** Container service was started in July, 1954, and 30 containers are now in service. Two types are in use: type A measures 1170 × 1050 × 1305 mm outside overall, type B 1885 × 1465 × 1800; capacities are one ton and 1.34 m³ and 4.25 tons, 3.5 m³. Containers are not interchanged and the railway system does not provide road transport; container traffic has to date been insignificant as a percentage of total freight, and no extension of the service is planned in the near future.

THE ORIGINAL SPRAY STARTING FLUID*

• Starts diesel and gasoline engines (from the smallest to the largest) down to 65° F. below zero • Starts in seconds • Excellent in humid weather too • Millions of cans sold • See your automotive jobber or farm equipment dealer.

*The inventors of spray starting fluid. Patent No. 2,948,595

Ask for the can with the "balky donkey" trademark

SPRAY PRODUCTS CORPORATION

P.O. Box 1988 • Camden 1, N.J.

ZIG-ZAG SLEEPERS CONTINUED

the total purchase and installation cost to slightly more than that of wooden sleepers. As the NS has not used long-welded rail with wooden sleepers, no reliable cost-per-kilometer comparison is available. Likewise, relatively short experience with zig-zag track has not produced reliable comparisons of maintenance cost. The NS estimates, however, that the combination of welded rail and zig-zag track construction will result in a maintenance saving of approximately 30 per cent or better. Experience to date indicates that the best practice, once track has been installed, will be to return for final adjustments and checks about one to three months later, and indications are that subsequent maintenance will be required only at intervals of from nine to twelve months, compared with two to three-month intervals for wooden-sleepered track.

Coming in IRJ.....

- Planning for 25-kv electrification
- New look for Irish Transport
- New diesel for East Germany
- Tokyo Electric Express Railway

.....and railway news from around the world

International Railway Journal

Advertisers' Index

ADVERTISER	PAGE NO.
Bolton Gate Company, Ltd.	55
Garlock, Inc.	57
General Electric Company	11
General Motors Overseas Operations	15
General Railway Signal Company	16, 17
General Steel Castings Corporation	4
Jackson Vibrators, Inc.	8, 9
Joyce-Cridland Company	6
Kango Electric Hammers, Ltd.	12, 13
Kershaw Manufacturing Company	3
Matisa (Materiel Industriel S.A.)	51
Miner, Inc., W. H.	Inside Back Cover
National Malleable & Steel Castings Company	Back Cover
Rolls-Royce (Railway Traction Ltd.)	Inside Front Cover
SES Mij. voor Spoorwegbovenbouw	55
Simmons-Boardman Publishing Corporation	52, 53, 57
Sprague Devices, Inc.	49
Spray Products Corporation	56
Vapor International Corporation, Ltd.	54

An authoritative book of fascinating interest to everyone concerned with the future of transportation.

MONORAILS

by Hermann S. D. Botzow, Jr.

This recently published book gives an objective view of the potential of monorail tranportation in the United States. Following the introductory section, which traces the history of monorail, the author discusses types, cars, track and structures, stations, wayside equipment, particular monorail characteristics, and the economics of monorail as a means of transportation.

The appendices contain detailed data on constructed and proposed monorails, car characteristics, rail cross sections, rail supports, operating costs, and platform clearance diagrams. The bibliography is probably the most complete of any on the subject.

104 pp. 15 illus. 10 diagrams and charts. $3.95

TO ORDER — Fill out the coupon below and mail to Simmons-Boardman's New-York office. Orders placed outside United States should be accompanied by remittance in United States funds by draft or international postal money order.

Simmons-Boardman Books RLJ 361
30 Church St., New York 7, N. Y.

Please send Botzow: MONORAILS, for which I enclose $3.95.

(NOTE: Add 50 cents per book ordered for handling and shipping.)

Name .....

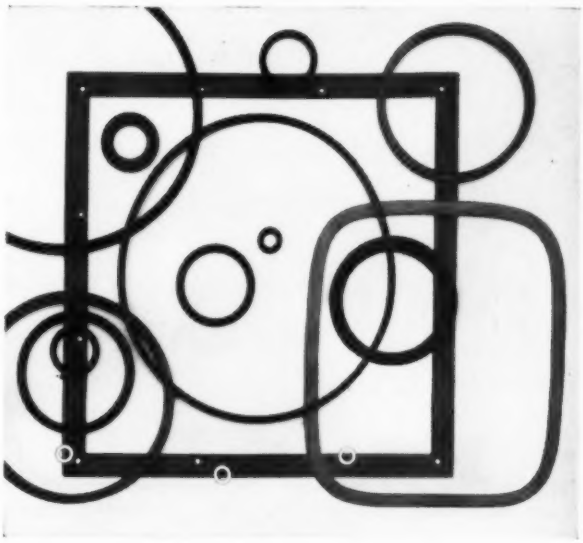
Street .....

City ..... State .....

(Advertisement)

EMPAQUETADURAS DE DISEÑO ESPECIAL

para locomotoras diesel



Las empaquetaduras y sellajes de caucho sintético Garlock están diseñados y fabricados para obtener un sellado mejor a más bajo costo . . . resultado de más de setenta años de experiencia en la industria ferroviaria. La Garlock está bien capacitada para recomendar los mejores materiales de sellaje para cada aplicación. Todos los materiales están fabricados por la Garlock, en las instalaciones de esta firma, y empacados de modo que puedan identificarse fácilmente para mayor conveniencia en el almacén. Además los precios representan un verdadero ahorro en los presupuestos para compras. Ya se trate de sellajes de culatas de cilindros, empaquetaduras de filtros, acopladores para compresores, o aros de refuerzo de ¼", puede confiar en que la Garlock tiene todo lo necesario para sus equipos diesel. Todas las piezas están preparadas para resistir el aire, el agua, aceites, gas, ácidos, o cualquier combinación de ellos, dependiendo del uso a que se vayan a dedicar.

GARLOCK

Los representantes ferroviarios Garlock son especialistas en el ramo, y la experiencia que han adquirido con otros ferrocarriles puede resultarle de gran utilidad a usted. Aproveche este servicio incomparable que le brinda el distribuidor Garlock de su localidad. O escriba a GARLOCK INC., Palmyra, Nueva York, E. U. A.

Escoja entre los 2000 renglones de la Garlock . . . dos mil estilos distintos de empaquetaduras, sellajes, caucho moldeado y estirado a presión, y productos de plástico.

New Chief Discusses UIC Role

John Ratter, CBE, BSc, M.Inst. CE

•

In November 1960 a member of the British Transport Commission, John Ratter, was appointed President of the International Union of Railways (UIC) for a two-year term in succession to Prof. Dr. H. M. Oeftering, President of the German Federal Railways. John Ratter's railway career extends over 30 years from when he joined the former London and North Eastern Railway in 1929 to his present position as a member of the BTC.

He joined the London Passenger Transport Board in 1936 as an assistant in the permanent way department. Two years later he rejoined the LNER and, following war service, continued with this system being appointed permanent way assistant to the engineer, King's Cross, in 1946. In 1947 he rejoined the LPTB as civil engineer (maintenance). In 1951 he was appointed chief officer engineering (works) at the Railway Executive headquarters. Following the Transport Act he became, in October 1953, the chief officer (civil engineering), British Transport Commission. He became technical adviser in January 1955 and in October 1958 was appointed a member of the BTC.

International Railway Journal sought the new president's views on a number of topics which currently affect railways, particularly those in Europe.

UIC today has developed beyond its original purpose, which was to enable international services to be operated. This basic concept is still important because the greater the efficiency of the railways the better they are able to face competition. The overall aim is to make the railway the most attractive transport medium. But UIC is also making some fairly deep studies into the economic position of rail transport—where it stands in relation to present day requirements and developments. There is also the question of the part which UIC should play in helping the railway administrations of developing countries.

To sum up, UIC has three duties:

- To make railway services—freight and passenger—as efficient as possible.
- To study the economics of transport and to find the true position of rail transport.
- To help countries outside Europe needing technical assistance.

Research and Development

UIC would like to see the Office for Research and Development (ORE) as the principal clearing house for ideas and developments. Some railways can go it alone on research but the greater the degree of co-operative effort the better. This is particularly important with the rapid development of new techniques at the present time. One must realise that most railways—in Europe at least—are fighting for their very existence. This may be over-dramatizing the situation, but nevertheless the more the railways get together the better. ORE's role will become increasingly valuable.

Position of Britain

British Railways are taking a considerable interest in the activities of UIC. They fully realize that the pooling of knowledge is becoming more and more necessary. One factor which could substantially change Britain's "railway relations" with the Continent would be the construction of a Channel Tunnel. Such a physical link would make a lot of difference and allow a new concept of Anglo-Continental rail service to be offered.

Standardization

A great deal has been done in the way of standardization already. This trend will continue, particularly as Europe becomes more and more a single entity rather than a group of separate nations. Standardization of many items of equipment and components has already been achieved and UIC specifications for equipment are being used outside Europe and often being adopted throughout the world. At the present time an important study is being made of an automatic coupler which would be compatible with the automatic coupler now being developed in Eastern Europe. Considerable progress has been made with the standardization of containers: specifications have been produced for three sizes of international container.

The Railways' Future

Much depends on political and economic factors. Most systems have really reached the end of a first stage of modernization. Greater and greater emphasis will be placed on increasing productivity of the staff. Work study will also be increasingly important.

Nouveau président discute l'avenir de l'UIC

Dans l'interview du 20.1.60 de Robert Spark de l'International Railway Journal avec John Ratter, le nouveau président de l'Union Internationale des Chemins de Fer, a discuté les problèmes auxquels l'UIC aura à faire face au cours des dix prochaines années.

Neuer Präsident diskutiert nächstes Jahrzehnt der UIC

In einem Januar-Interview mit Robert Spark vom International Railway Journal sprach der neue Präsident des Internationalen Eisenbahnverbandes, John Ratter, England, über die Probleme, denen die UIC in den nächsten zehn Jahren gegenüberstehen wird.

Nuevo Presidente discute la próxima década de la UIC

En un interviú, al 20 de enero, con el Sr. Robert Spark de IRJ el nuevo presidente de la UIC, el Sr. John Ratter de Gran Bretaña discutió los problemas, a los que la UIC tiene que hacer frente durante los diez años que vienen.

MINER®

RAILWAY APPLIANCES

1

1 **B-18 Type Buffer** widely used in cars, coaches and locomotives where side buffers are required.

2

2 **A-120-P Draft Gear** used in combination with B-18 type buffer where hook coupling is used, either with yoke application or with pull rod through the gear.

3 **A-22-SAXL Draft Gear.** Thousands have been applied throughout the world where center automatic couplers are used.

4 **RF-333 Draft Gear.** A combination rubber-friction draft gear providing maximum shock protection in a 24⅝" gear pocket.

3

4

W. H. MINER, INC.

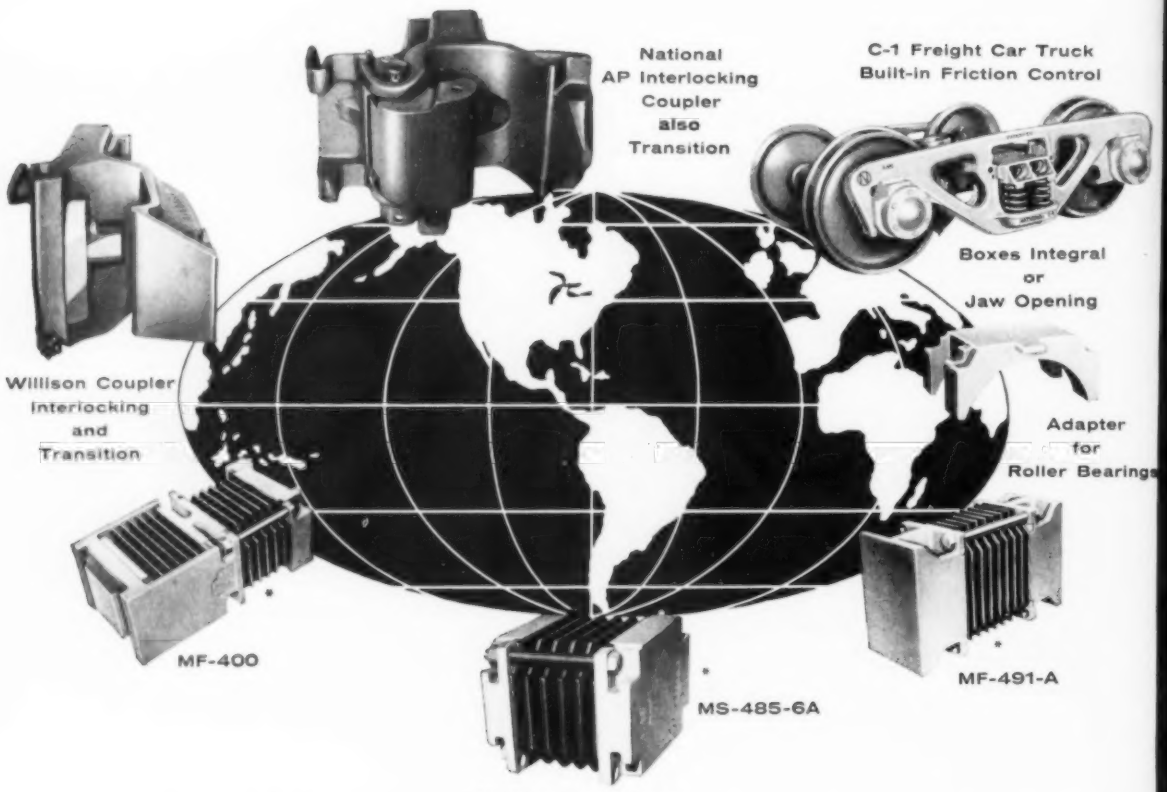
OFFICE OF FOREIGN OPERATIONS

1212 Pennsylvania Building, 425 Thirteenth Street, N.W., Washington 4, D.C., U.S.A.

Proven for Advanced Railroad Operations

WORLD WIDE

vital components of "NATIONAL" design



*Rubber Draft Gears

adapted to meet existing end-use conditions

draw-gear assemblies • couplers • yokes • draftgears

Unmatched experience and comprehensive facilities of "NATIONAL" TECHNICAL CENTER assists our LICENSEES in both hemispheres with designs long demonstrated the best to AAR and other standards . . . automatic couplers either rigid or rotary shanks . . . draft gears both rubber and metallic . . . yokes . . . trucks with longest life of all working parts.

A-4110A

International Division Headquarters

NATIONAL
MALLEABLE AND STEEL
CASTINGS
COMPANY
Cleveland 6, Ohio

M
A
R

1
9
1

XU